POPULAR AVIATION

A Magazine for Everyone Interested in GLIDERS LIGHTPLANES MODELS

Volume IX AUGUST, 1931 Number 2

TABLE OF CONTENTS

FEATURE ARTICLES

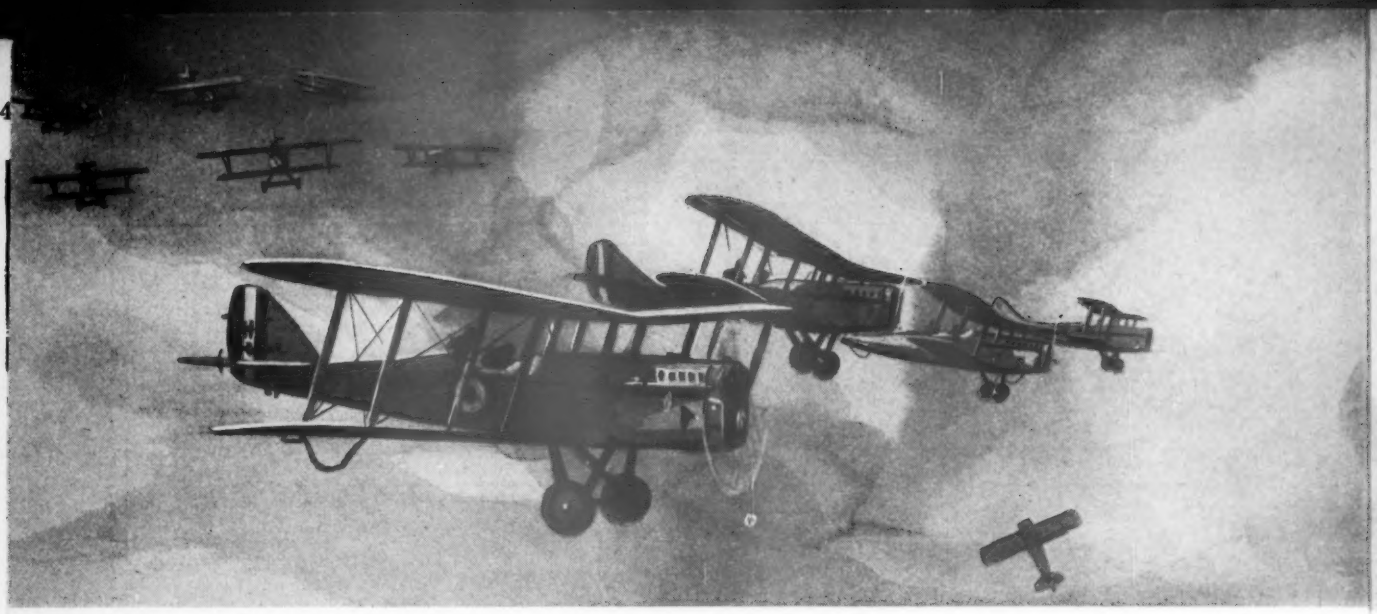
An Airy Chat with the Editor 4
The Suicide Patrol 6
The Flying Newsreel Reporters 11
My First Parachute Jump 15
Novel Ways to Catapult Your Glider 19
Is the Battleship Doomed? 22
The Round Robin Club 26
A Tour Through an Airplane Factory 27
Henry Hunt and His Planes 29
Tales Around the Hangar 30
An Encounter with Savages 31
Some Novelties of the Early Days 35
The Inside Story of the Christmas Bullet 37
Questions and Answers Department 39
Junior Activities 42
Practical Lessons in Flying 43
The Disheartening Experiences of a Glider Club 45
How to Build the Whipper Snapper 47
Model Department 48
Women's Activities 52

THE PICK OF THE BRIEFS

Glider Cradle Makes Training Foolproof 9
Hero or Traitor? 9
Amateur Builds Remarkable Lightplane 10
The Kellett K-2, the Newest Autogiro 13
The Nicholson Junior, an Attractive New Lightplane 14
World's Non-Refueling Endurance Record Broken 17
Flyers Get Pinched for Blocking Traffic 17
Three New Lightplane Engines 18
The U.S.S. Akron—What Good is It? 18
Happy Weigrand's Adventures with a Rattler 18
New Balloon Tire Offers Better Streamlining 20
The Bearded Lady 21
War Pilot Meets His Rescuer 25
New Devices Make Blind Landings Possible 26
These Planes Flew in Army Demonstration 29
Wind Tunnel Principles Used in Roof Landing Platform 30
Scale Drawings of the Inland Super Sport 33
Mechanical Man Inaugurates Air Line 34
The Ruse that Saved a Life 34
The First Aerial Passengers 37
Planes Unearth Archeological Treasures 38
Novel Airport Marking Guides Flyers 38
One Exciting Jump 41
How to Report an Accident 41
The Autobiography of a Hoodoo Plane 42
How I Taught Myself to Fly 46

POPULAR AVIATION. Volume 9, Number 2. Published monthly by Aeronautical Publications, Inc., at 608 South Dearborn Street, Chicago, U. S. A. William B. Ziff, Publisher; B. G. Davis, Editor; David E. McMillan, Jr., Managing Editor. New York Office, 551 Fifth Avenue, New York City. Subscription $2.50 per year; single copies, 25 cents, foreign postage, $1.00 per year extra. All contributions paid for at regular rates, but the publishers can not be responsible for the loss of any manuscripts or materials submitted. Entered as second-class matter, June 16, 1931, at the Post Office, Chicago, Ill, under the act of March 3, 1879. Copyrt,1931, by Aeronautical Publications, Inc.

XUM



The SUICIDE PATROL

The grim history of the day bombers

by

LIEUT. JAMES M. RICHARDSON D. S. C.

EVERY impartial man, not concerned with generalities, who knows anything about aviation and the manner it was practiced by the United States in the late war realizes that day bombing was so much more hazardous than pursuit that comparison is absurd.

Let me analyze briefly: day bombing machines were large and relatively slow, with a great cruising radius. They could and did penetrate enemy territory to a depth no pursuit machine could attain because of its smaller gasoline capacity.

Generally, the bombers' objectives were far in the rear of the enemy lines: concentration points for troops, munition dumps, strategic railway centers. To gain their objectives they often had to defend themselves from attacking enemy machines from the time they crossed the lines until they re-crossed coming out.

Bombing planes did not maneuver well, so their defense consisted of tight formations and the power that lay in the observers' guns, often a far from potent power. Stunts availed them little anyway, for twisting the plane about always detached them from the formation and made them easy prey for a flock of Fokkers. If anything kept the Fokkers at a respectful distance, it was fear of the concentrated fire from a formation.

The Germans did little day bombing themselves, but their system of defense against it was perfect. If they outnumbered the bombers, which was usually the case, they dived from every conceivable point and made a dog-fight of it. If they didn't attempt this, they sometimes hung in the rear and picked off the last man in the formation; or they let one pilot dive underneath and attack the most vulnerable spot of the bomber, while the rest of them attempted to divert the observers' attention by firing at him from a long range.

There are cases on record where they brought down practically whole formations by this gradual wearing process. Fokkers were so much faster and more mobile than our day-bombing planes that they inflicted appalling casualties.

After the war I had a German pursuit pilot tell me that they considered it child's play to toy with American day bombers, that every German squadron which got an assignment to give battle to our bombers not only expected to return intact, but it expected to return with several victories to its credit. "I, myself," continued the German, "looked upon this work as a species of murder."

Why, then, did we persist in it to the end, especially since the material damage done by bombing raids was questioned and in a great many cases proved to be of slight extent? One need not seek far for the answer. In the first place, we took our cue from the English and modelled our Air Service on their organization. Day bombing was a big part of the British program in the latter days of the war. Secondly, there could be no question but that bombing shattered the morale of the enemy.

But no matter what angle one attacks the problem from, he must come inevitably to the conclusion that a great many lives were needlessly sacrificed in day bombing. We failed utterly to derive anything properly describable as profit from the experience of our Allies. It was gross negligence to disregard the tactical warnings given us; it was even graver error to equip any bombing squadrons with Liberty-motored De Havilands. "Flaming Coffins," the name commonly applied to them, tells its own vivid story.

The gasoline tank in the De Haviland 4 was large, in the wrong place and unprotected by the rubber lining that sealed after a bullet went through and prevented leakage and flames. The bomb racks were constructed to carry ten bombs, but the machine could carry but two safely. In brief, the De Haviland 4 was antiquated and had already been discarded by the Allies as a type before we got our first ones on the front.

Yes, the day bombing work was the most dangerous of all the branches of the Air Service. As a final proof, compare the casualties of the First Pursuit Group and three squadrons of the First Day Bombing Group.

First Pursuit Group	*Commenced Operations*	*Casualties*
94th Squadron	April 14, 1918	9
95th Squadron	May 4, 1918	7
27th Squadron	May 28, 1918	11
147th Squadron	May 28, 1918	8

First Day Bombardment Group	*Commenced Operations*	*Casualties*
96th Squadron	June 12, 1918	17
20th Squadron	Sept. 12, 1918	17
11th Squadron	Sept. 12, 1918	13

Combining the figures above, it will be seen that the pursuit squadrons operated a total of 736 days with 35 killed. The day-bombing squadrons, on the other hand, operated a total of 282 days with 47 killed. Thus day bombing was almost four times as hazardous as pursuit.

Having given you some conception of the dangers and difficulties confronting day bombing squadrons, I shall relate in detail a few of their extraordinary adventures. You shall go with these men of iron courage, see them face the death that they believed antiquated machines and tactical blunders would cause.

THE history of day bombardment in the American Air Service is composed of a series of disasters, ushered in by the catastrophe of early July, 1918, known as Major Brown's Party."

The members of the 96th Squadron, our first day bombardment unit to go into action, reached the front on May 18, 1918, and established themselves at Amanty. For equipment they had ineffective French bombs and ten French planes of the Breguet type which had already seen service at the bombing school of Clermont-Ferrand and were partially worn out. The personnel had been training with French and British squadrons. Major Brown, then commanding the 96th Squadron, had orders to raid whenever it seemed possible.

One very cloudy day, despite the advice of the French and British, he ordered his flight up and headed for Germany. He had chosen about the only moment of the day when an inch of sky was visible. Finally his flight of six machines climbed above the clouds. They got into formation and, with a young gale blowing at their backs, raced towards Germany. On they went above the clouds until they saw a rift in them and a city underneath.

It is reported that they dropped their bombs and started for home, but could make no headway against the strong wind. After two hours their gasoline supply was exhausted, and all were forced to land in the Moselle Valley not far from the Rhine. The party was composed of Major Brown, Lieutenants Browning, Lewis, Smith, McDonald, Ratterman, Duke, Tichenor, McChesney, Mellen, Tucker and Strong.

In spite of the efforts made by some of them to escape, all were captured. That same night German wireless reported that five Breguet bombing machines, five American pilots and five American observers had been taken into custody about 6 p. m. after failing in a raid on Coblenz. The Germans captured the other machine and its occupants later.

Major Brown's party had its humorous slant. A few days after he and his flight were made prisoners, the Germans dropped a note on an American airdome. It read: "Thanks for the Breguets, but what shall we do with the major?"

After the Brown disaster the 96th Squadron had but two planes on hand and but one of these available for duty. Was this not a sad commentary on the difference between what passed for propaganda and actuality? From the declaration of war we had boasted in America of our ability and determination to bomb Germany into submission.

One got the idea from reading gaudy posters and the newspapers that the Air Service would concentrate on this. Actually, the day-bombardment units were relatively slower than either pursuit or observation in getting into action. We had at least fourteen pursuit squadrons and ten observation squadrons on the front before the second day-bombardment squadron got under way.

"To my mind the three squadrons that bore the brunt of our day-bombardment work wrote the brightest chapter in heroism of all the American forces. I except neither infantry, artillery, engineers, nor signal corps . . . It required superb courage to face almost certain death day after day—"

The chief obstacle lay in our inability to procure planes. The De Havilands from America were late in arriving. The French and English, on whom we relied principally for our planes, were furnishing us observation and pursuit machines but sufficient bombing planes to equip just one squadron. It is only fair to Air Servive organization to say that, no matter what the popular impression was, their final plan was not to have a preponderance of bombardment units.

AS A result of "Major Brown's Party," the 96th Squadron was left with only two planes, and it was the latter part of July before they got new machines from the French and started operations again. In August they made frequent raids with but few casualties. In September, it is reported, the Germans sent one of their best pursuit groups down to the Verdun sector to paralyze American day bombing before it became really effective. They almost accomplished their task.

On September 4, eight machines of the 96th Squadron participated in a raid. The wind was so high that they had some difficulty in bombing the objective. At last, however, they pulled the strings and the bombs shot down to their work of destruction on the railway tracks beneath. The formation had hardly turned for home when Fokkers began to attack them from every point. They swarmed in from the rear, from overhead, from underneath; more and more of them, fighting desperately to break up the formation. It was a terrific battle with fifteen or eighteen Fokkers matched against but eight of our planes.

The Fokkers realized their superiority and came within 25 yards, hanging on their propellers underneath, diving recklessly but with marvelous teamwork, forever pouring a steady stream of bullets into our bombers. Only staunch planes like Breguets could stand the bitter and terrible fire; each

of the eight planes had at least two Fokkers plugging at it, and the rear man in the formation had four or five to withstand. So many bullets were thrown at them and from such close quarters that the occupants of the bombers could feel the impact of the bullets with the wings and fuselage.

Faster and faster went the bombers, holding resolutely to their formation in spite of the deadly fire. The observers were able to get in some effective shots and destroyed two Fokkers. Over a twenty-five mile flight the battle raged. Most of the time our flight commander, showing unusual leadership, kept the formation going straight into the sun and thus probably saved them all from destruction.

As it was, four men were badly wounded. Lieutenant McLennan, observer, was shot in both legs and fell into the cockpit. His pilot, "Sheep" Alexander of Wellesley, Massachusetts, was seriously wounded, the bullet entering his side and passing through his abdomen. In spite of this he brought his machine safely to his home airdome, thus exhibiting great courage.

Thus the day bombers fought on against all odds until finally on September 16th orders were given the 96th Squadron to bomb Conflans. Six Breguets, heavily loaded, left the field at Amanty and started the long and wearisome climb that always preceded these expeditions. During this process two machines were seen to glide back to the field on account of faulty motors. The remaining four took their places behind the leader, the formation crawled away towards the Meuse and crossed the lines east of St. Mihiel.

They were approaching Conflans now and suddenly the leader fired a rocket—seven red balls—the signal that enemy aircraft had been sighted. In the distance they saw the dusky hawk-like forms bearing down on them. That moment was always a terrible one with a bombing pilot, for he realized that it meant a battle with the odds ten to one against him.

One cannot refrain from admiring the iron courage of the flight leader on this raid. He had, for the moment, but one interest in life—the delivery of a load of bombs consigned to Conflans. The Fokkers were as thick as sparrows in the sky. But to hell with the Fokkers! They *would* drop those bombs!

A slight pull from the leading observer on the reins attached to his pilot; the pilot turned his machine slightly. The leading observer fired the rocket to give the "all set" signal. The doubly tense moment arrived. The objective passed along the sighting apparatus. All levers were pulled and the bombs whizzed downwards. And now for the battle which everybody had known from the beginning could not be avoided.

THERE were three groups of the hostile planes (Fokkers and Pfalz); the first circled to cut them off from home, the second to their rear, the third came head on. All together they numbered twenty-four, and the first wave concentrated its fire on Number 2 machine. It is thought that the pilot was hit by the first burst, for the machine immediately went out of control and dropped in flames. And beside it went a Fokker, burning fiercely like a meteor.

Again the Germans concentrated their fire, this time on Number 4 machine. Burst after burst crashed into it, as the three American observers fired almost point blank at the enemy planes which came within twenty-five yards, diving and turning up until the black crosses on the lower wings could be seen, climbing from below and seeming to hang on like murderous humming birds with venom pouring from their beaks, and, at last, down fell Number 4 in flames.

Number 1 machine came next. An explosive bullet in the gasoline tank, and it dived for the ground on fire.

Then to Lieutenant Codman of Boston, and Lieutenant McDowell of Philadelphia, in plane Number 3 came the maddening task of trying to defend themselves against twenty-three of the enemy. There was a deluge of bullets from both Fokkers and Pfalz. They came so close that McDowell could almost see the features of the pilots.

McDowell's guns worked beautifully. Though he was soon severely wounded, he stuck valiantly by them and had the satisfaction of seeing three of his opponents succumb to his fire. Not even this weakened the determination of the Germans, and they hung on until they brought down this last plane of the flight. Fortunately it did not take fire, and Codman, though wounded, managed a safe landing. He and McDowell, the sole survivors of the flight, were made prisoners.

I have attempted to give a true picture of conditions in day bombardment work, but it is beyond my meagre powers to convey an idea of the iron fortitude one had to have in his make-up to stand the terrific strain imposed upon it by this deadly and grim mode of warfare. Can you conceive that any fighter's nervous system could stand the strain of having flight after flight of his squadron shot down in its entirety? Or, if not this, of seeing flights straggle home with half the personnel dead or wounded and their planes riddled with bullets.

A member of the 96th Squadron has said: "The strain of the work and conditions in the squadron were such that many men were unable to stand it, and *when the Armistice was signed there was only one pilot who had remained with the squadron from the time of its transference to the front in June*"—five months before.

THE 20th Squadron — First Day Bombardment Group—was ready for operations on September 11, 1918. It was equipped with the much-heralded, Liberty-motored De Haviland plane. On the first day of the St. Mihiel push members of the squadron were ordered to do observation work; others were ordered to fly in formations with pursuit squadrons.

It was actually believed, though why I have never been able to discover, that the De Haviland plane had sufficient speed to keep up with a Spad and could thus be used as a two-seater fighter. The Spads ran away so fast that the De Havilands seemed to be anchored in the sky.

On the next day the 20th Squadron had the distinction of being the first one using American-built planes to bomb the enemy.

For a time the squadron seemed to pack a bunch of horse shoes. Battling back and forth over the lines during the period from September 13 to September 23, its members made nine successful raids and had but one man killed.

But September 26, 1918, the first day of the Meuse-Argonne offensive, was a day that no living member of the 20th Squadron will ever forget, a day marked by great tragedies but also by a display of courage which was not surpassed in any branch of the service during the war.

The 20th Squadron was ordered to bomb Dun-sur-Meuse. The take-off, through a thick fog, was quite dangerous. Emerging finally into blue sky and sunshine, seven machines climbed for altitude and crossed the lines together. Some time later a plane of the 11th Squadron, carrying Lieutenant William Waring, pilot, and Lieutenant Sigbert Norris, observer, joined

(*Continued on page* 62)

Left, a D. H. 4 of the 166th Squadron with a Breguet of the 9th Squadron on a Field at Trier, Germany, after the Armistice.

XUM

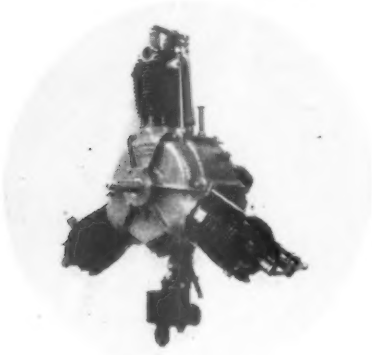
Stunting to be Banned?

THAT unnecessary stunting, recognized as the cause of many aircraft accidents in the past, is frowned upon by the aviation industry is revealed in the safety code prepared by the Aeronautical Chamber of Commerce.

It advocates prohibiting stunting in all commercial flying, and says that practice maneuvering to acquaint the pilot with the characteristics of the plane he is flying should be allowed only outside of regular runs and with the special permission of the operations manager, while practice maneuvering on the part of students should be under the careful supervision of an experienced instructor.

The code also would prohibit students and inexperienced pilots from flying over congested areas, so their own and the lives of others will not be endangered.

A New Engine for Lightplanes



HENRY LOWE BROWNBACK, who designed the last series Anzani engines, and more recently the 90-h.p. Brownback C-400, has now designed the "Bumble Bee," a three-cylinder engine for lightplanes. In view of present conditions production on this engine has not yet started, but it is expected that the "Bumble Bee" will be available for lightplanes in the near future.

The engine is an aircooled type with a bore of 3.5 inches and stroke of 4.13 inches, giving a displacement of 120 cubic inches. It is rated at 25 h.p. at 1600 r.p.m. and produces 30-h.p. at 1800. The weight with all accessories except the propeller hub is 99 pounds.

German Hangar Fees Reduced

STARTING and landing fees for German sport planes have been reduced at all airports which are members of the Association of German Airports. A charge of approximately 12 cents will be made for each start and landing. Wherever hangar accommodations are available, the sport planes may be kept over night at a standard rate of 2 marks (about 47 cents).

Glider Cradle Makes Training Foolproof

Young Stribling, famous boxer and flyer, demonstrates the new Cradle.

AN ingenious device which should prove valuable for training glider pilots has recently been marketed by the Drake Brothers of Thomasville, Ga.

The "Glider Cradle," as it is called, is designed to acquaint the novice with the proper control of a glider with perfect safety both to himself and the glider. A normal primary trainer rests in the Cradle, attached only by two wires at the nose and tail of the skid.

The Cradle may be towed at high speed, and the glider can take off in free flight, but is restrained from going more than three feet high. Side wind gusts or faulty aileron control can not tip the glider wing into the ground, because the wing landing wires are caught by the wing ropes on either side of the Cradle.

If instructions are followed there is no possible way for the student to get hurt or the glider to get damaged while the student is going through his period of learning. The student is expected to miss-control and over-control and ample provision have been made in the design of the Cradle to take care of these conditions.

HERO OR TRAITOR?

JUST how does a man act when he is accused of treason to his country, threatened with death before a firing squad, with all circumstances against him? Major Carl Spatz of the United States Army Air Corps was in such a position during the late World War.

Major Spatz enthusiastically entered the war as an experienced flyer in charge of the training school at Issoudun. He who had been graduated from the U. S. Military Academy and later taught to fly by the Wrights was made a school teacher in France. And the job did not please him. He wanted to get into the fight. Week after week he petitioned headquarters for a transfer to a flying squad and each time he was denied.

It seemed to him as if the war would be over without his ever seeing actual combat. His superior officers felt he was an important factor as the trainer of hundreds of flying fighters, whereas he would be only one more fighter on the aerial battlefield.

To Major Spatz the climax was reached in the summer of 1918 when rumors came to him of a vast offensive soon to be undertaken in the St. Mihiel sector. There the air forces would be concentrated. His pupils all keenly anticipated the coming fight. The commander himself became moody, and was heard to mutter to himself uncomplimentary things about his superiors. And then one day he disappeared!

Captain Jack Hoover, a former pupil of the Issoudun school, and himself at that time victor in five "dog fights," was puzzled when Major Spatz turned up at his flight unit without explanation. The Major was unshaved, his uniform wrinkled and stripped of all insignia of rank or station. Briefly he asked Captain Hoover for a good ship with dependable guns. The ship was provided. Away toward Germany went the Major.

Turmoil reigned at Issoudun. Their dependable commanding officer was gone. And after all little was known about him except that he was an excellent flyer. But, it was pointed out, he had a German name and spoke German fluently. There were people ready to say he had turned traitor and that it was no more than they had expected.

In the meantime, Major Spatz had indeed headed toward Germany, but to him it meant heading toward the fight. That first day he sent a German plane down in flames. When he returned to Hoover's unit he found that news of this victory had preceded him. Two German planes went down before him the next day. The third day passed without reports; the fourth day brought two more victories and another came on the fifth day. By dark of the fifth day Major Spatz had not returned. Captain Hoover was worried.

Major Spatz had encountered a flock of Fokkers, had fought them and brought one down, but not without injury to his own ship. Sorely crippled the plane was eased down into a shell hole without greatly injuring its pilot.

(*Continued on page* 55)

May is a Month of Records

MAY is becoming known among pilots as the month of the big winds because of the number of speed records and near records that have been made.

Pilot Emery Martin started the record breaking when he flew a Ford transport for a record of 180 miles an hour between Oklahoma City and Fort Worth, a distance of 182 miles. He carried two passengers and a load of mail and express.

Edmund Matucha, piloting a single motored mail plane, a few days later flew the distance of 457 miles between Kansas City and Chicago in two hours and 38 minutes for a near record of 172 miles an hour.

On the eastern division of N. A. T. between Cleveland and Newark, Pilot J. F. Wolf made two unusually fast flights when he flew the distance of 418 miles in 2 hours and 32 minutes for a speed of 165 miles an hour and a few days later made the same flight at a speed of 177 miles an hour. Pilot Dean Smith just missed attaining an all time transport record when he flew the same run at 187 miles an hour.

The record for the fastest flight between Cleveland and Newark in a regularly scheduled transport plane is held by S. P. Samson, who flew the distance in 2 hours and 10 minutes for a speed of 192 miles an hour.

The fast flights have been made possible, of course, by the strong May winds which at times have reached a velocity of 55 to 60 miles an hour. An unusual feature of the winds has been their variable direction.

Los Angeles Plans Pageant

TWENTY-ONE years after America's first air meet at Los Angeles in January, 1910, the same city now is planning another huge air tournament as the crowning feature of La Fiesta de Los Angeles, the city's 150th birthday celebration, September 4 to 13.

Aircraft pioneers recall that during the 1910 meet, Louis Paulhan made the world gasp with a sustained flight of forty-five miles. The duration of the flight did not matter; the startling feature was that he had actually covered such a great distance without mishap.

Officials of the 1931 air fiesta are planning to reproduce a model of the plane used by Paulhan in this sensational feat, as well as other early types which made aviation history. These will be contrasted with present day craft such as the 200-miles-an-hour speedsters and the 32-passenger sky omnibusses.

The Navy's giant dirigible Los Angeles, the autogiro and the latest types of gliders are expected to participate in the meet.

A unique event will be the amphibian race, in which planes will alight on the sea, pick up bathing beauties, land with them at the airport, and the girls "leg it" in a foot-race to the finishing tape—a literal adaptation of the winged heels of Mercury, with a dash of Venus rising from the sea.

Other listed events include formation flying and military maneuvers, parachute jumping, balloon "strafing," dead stick landings, smoke screen laying and miniature model contests.

Amateur Designs and Builds Remarkable Lightplane

Joseph Terle, center, shows his plane to Dick Pope, left, and Bert Acosta. After flying the tiny ship, Acosta pronounced it a perfect job.

HE WENT crazy over aviation but couldn't buy a plane. And so he built one in his back yard, took her out to Roosevelt Field, got Bert Acosta to pilot her . . . and, by gosh, she flew!

That, in brief, is the story of Joseph Terle, a young job printer who has never been able to afford flying lessons, but who was always interested in aviation though never in the air. He started to build a plane in his own backyard.

He built the fuselage first, of wood-wire construction, with the front half of plywood. The welding was the only thing he had to hire someone to do. When it came time to figure out what wing to use, he could not dope out the formulas, never having been to high school.

Accordingly Terle studied algebra and some mathematics before he went further. He learned rapidly and soon decided to use the Clark Y wing section when he was able to figure out how much it would lift, the necessary span and other pertinent formulas.

The span of his completed ship is

(*Continued on page* 54)

Young 'Chute Jumper Lives Life of Thrills

LADY LUCK has given Ralph E. Voorhis of New Jersey something better than an even break, considering the way he has tempted fate in his 21 years of life.

Things fast and perilous have a fascination for him. At 18 he was thrown from his motorcycle in a race when traveling 65 miles an hour. He received a dislocated shoulder. A year later he and his motor bike collided with a sand pile on a dark road at night. Voorhis was hurled 15 feet and badly hurt.

His first parachute jump was in 1929 under Ralph Penly, an old-timer of the parachute game. A week before the jump, Voorhis had cracked up in a "Waco 9" but emerged from the wreckage unhurt. His nerve, too, was still good, but due for a greater strain. In a jump at Arcola, N. J., the latter part of 1930, he jerked the rip-cord only to discover that the chute was tangled in the pack and would not open. Voorhis pulled the emergency chute, and one of the buckles on the riser struck him, tearing a bad wound in his throat. He lost a great amount of blood but recovered in time to make another jump two weeks later.

The young parachute jumper's latest mishap took place April 12 at Pine Brook, N. J. He dropped 2,000 feet before pulling the cord—and the chute ripped out two panels when it opened. Voorhis landed unhurt, but he hit the ground with breath-taking force.

His record for thrills will be longer by several jumps in the near future—if he lives to make them.

Parks is on the Air

A UNIQUE method of telling parents of boys interested in aviation the type of training available has been inaugurated by Parks Air College in weekly broadcasts every Tuesday night at 9:30 o'clock over KWK. The half-hour period is called "Skyward Ho!"

XUM

The Flying Newsreel Reporters

Two rival newsreel planes fought bitterly to bring back the best action pictures of the St. Francis flood. But disaster united them in a more thrilling fight for life itself.

by A. KINNEY GRIFFITH

Right, Steene and his pilot just before taking off for some aerial sequences during the filming of "Hell's Angels." Below, a group of flying photographers, Jim Barry on the right.

BACK IN the "good old days" before the movies learned to talk, Jim Barry, pilot, and E. Burton Steene, cameraman, were a pair of aces that were unbeatable, and the motion picture industry knew it.

Barry was chief pilot for, and under contract with, the Pathe Weekly News Reel Company.

Steene was a First Cinematographer, member of The American Society of Cinematographers.

If there were any big news events to be photographed, they went out and shot the pictures. They broke records getting back to the lab where the films were developed and rushed to the theatres hours—even days—before the rival companies showed their films. Barry's and Steene's methods of getting the news shots and scooping their rivals were always clean and sportsmanlike. They acquired the name of "The Film Falcons" and held their honors.

Then came the advent of the talkies and great changes were made in the motion picture industry. Warner Brothers were spending millions on sound equipment and standing their patrons in line at the box office. Paramount saw this and followed suit. Warner Bros. bought out an established news reel company and soon talking news events followed their regular features on the screen. Paramount bought out a news reel company and made it bigger and better. Other big producers followed in the trend of popular demand. Competition was keen.

A race started to buy out Pathe Weekly, which was the largest independent news reel company in existence.

Paramount offered a fabulous price; Warner Bros. raised the ante; Fox nearly doubled it; but Pathe said "not for sale."

Why should Pathe sell, or merge with somebody else? Pathe had plenty of up-to-date equipment; it had a personnel that was loyal and efficient; it had fat contracts with an abundance of exhibitors for the release of the news reels—and it had Jim Barry and E. Burton Steene to get the pictures and bring them in before their competitors were sometimes aware that there had been a big oil field fire, or an earthquake, or an ocean liner sinking, or a devastating tornado.

When the big producers finally woke up to the fact that Pathe was not to be theirs—hard luck began to fall upon the fearless shoulders of that independent company. One of their camera planes crashed while coming home with the shots of the Santa Barbara earthquake. When the wreck was found, pilot and cameraman were dead in their cockpits. Gossip had it that they had been shot down.

A fire broke out in their lab one day while the film of the LaBrea Oil Field fire was being developed. "Incendiary," some one said. Contracts with the various exhibitors could not be renewed when they expired: "the big producers are behind the boycott," the rumor ran. And so on.

AT THE height of this feverish struggle for supremacy, the worst disaster in the history of Southern California broke upon an astounded world. The St. Francis Dam had collapsed!

The Pathe production manager telephoned the news from his Hollywood office to the airport.

"Get Barry and Steene!" he yelled into the ear of the excited field clerk. "Our flying field is ten miles nearer to the scene than that of World Wide. They know about the disaster too. But we've got the breaks—a chance for the biggest scoop in years! Get Barry and Steene started! If we scoop the others we'll be sitting on top of the world!"

A few minutes later Jim Barry was in the pilot pit of his Waco, warming up the motor. Steene was in the camera pit, threading a roll of film into his big camera.

Soon the engine roared furiously, and the Waco darted down the runway and took to the air under wide open throttle. While Barry dynamited the ship aloft, Steene made sure his camera was ready for action. These two film falcons were in their element; but never before had they tackled anything half so important as this!

It was only a fifteen minute hop, as the flying field was just beyond the Santa Susanna Mountains from the big dam. The fast plane crossed the crest of the mountains and there, looking down from a clear sky, they had their first glimpse of the on-rushing calamity that was to take toll of over 400 lives and render thousands of people homeless and bankrupt.

A few revs farther on and they were swooping low over the spot where the great reservoir had been; now, only a broken mass of steel and concrete were left to testify where the dam-wall had been. The released water was hurtling down the canyon, rushing into Bouquet Canyon, backing up in Dry Canyon, smashing everything as it swept into Soledad Canyon, then like a monster tidal wave the torrent seemed to hesitate and gather for an all-consuming sweep down the Santa Clara River valley toward the ocean forty miles away.

Already two towns had gone down to destruction beneath the flood. The railroads and highways were swept aside like so much matchwood. Houses, automobiles, telephone poles, livestock, and people were caught and swept toward the ocean on the crest of the ten-foot high wall of tumbling water.

Over this seething maelstrom of disaster the Pathe plane swooped like a menacing bird of prey. Steene, standing upright in his pit, was grinding

away for all he was worth. Barry, careful that his partner could get the best shots possible, piloted the plane with the skill of a master. Down they dived almost into the maw of the on-rushing waters in order to get a close-up of a huge section of the dam's concrete base as it came tumbling down hill with the terrific pressure of water forcing it onward.

Sections of buildings, many carrying human burdens, came floating down on the flood; a man on top of an oil derrick was caught at his work without a chance to escape. Down went the derrick, down with a score of others nearby. Pump houses, tanks and steam boilers were swept away; some of the boilers exploding from the contact with cold water.

PEOPLE were scurrying here and there, trying to keep ahead of the flood. Crowded automobiles were rushing around like mad in their endeavor to find safety. Over it all swept the camera plane, recording every scene of the calamity. No rival company plane had as yet arrived upon the scene. The air was void of all other aircraft except for a plane carrying newspaper men.

Steene was grinding away like mad; Barry kept his thoughts on his flying and endeavored to get his ship into positions where Steene could get the best shots. The flood swept through and over the next town and came to where the river bed narrowed down between two steep hills.

Here the flood dammed up for a moment, then swept forward again with renewed fury. Jim Barry swooped low between the hills to give Steene a chance to record the scene of the waters plunging down hill on its drive toward the next town.

As Barry maneuvered in between the hills and ruddered around to clear a rocky cliff, another plane darted in from the right through an intersecting canyon. Barry had one wild glimpse of the biplane's sudden appearance from out of nowhere, and he saw the black letters WORLD WIDE on the other plane's fuselage. Instantly he swerved to the left, at the same time pulling back on his stick.

The Waco responded with a roar, but too late. The best Barry could do was avoid a headon collision with the rival plane, which so far appeared not to have seen him.

The next instant there came a rending rip as the wings of both ships collided. There was a sharp jerk.

The Waco continued its zoom, and the rival-reel plane staggered down toward the raging torrent. It had all happened in a split-second, just as most airplane accidents do happen—there is no time to think, but a good pilot will do the right thing automatically and instinctively. And that is exactly what Jim Barry had done. His almost superhuman flying skill had saved the lives of himself, Steene, and the two men in the rival plane. But not for long.

The other news reel men were far from being out of danger. Their left wing sections were hanging in shreds; pieces were falling off, only the ship's inherent stability kept it from instantly going into an uncontrollable spin toward the torrent of water fifty feet below.

For a moment the crippled ship leveled out. It tried to climb, but fell off. The canyon walls were two hundred feet high on either side. It couldn't fly over them; it couldn't fly level much longer. The roaring waters below seemed to reach up for the new victims.

IT REQUIRED only a glance to tell Jim Barry that the other plane was doomed. He shot a glance at his own wings and saw great strips of fabric

E. Burton Steene in the pit of his camera plane, ready to shoot the news.

blow off by the force of the speed, but the rigging, struts and stays were all intact. The controls were functioning perfectly. That was something!

"Get a picture of this!" he yelled over the cockpit phone to Steene.

He banked the Waco sharply and swerved in close to the crippled rival. Applying stick and rudder with the finesse of the born airman, he inched his torn wing-tip under the jagged stubs of the rival's left wing. He synchronized his throttle to the speed of the other ship. He worked his controls with patient skill, and in a moment both planes were flying level.

The other pilot looked across the narrow space with a smile of hope on his face. Barry motioned upward with his head. Both ships began to climb slowly, their longevity of life solely depending upon the sound judgment and cool nerve of Jim Barry.

Now they were level with the highest cliffs. They turned away from the canyon—turned toward the brush-covered flats that bordered the canyon. No water here, but neither was there a landing place. Ten feet above the brush tops they swept along, their motors throttled down almost to landing speed.

Things looked brighter for a moment; then the strain of the lifting Waco proved too great for the damaged spars of the rival biplane. The wings broke clean away from the fuselage, and the ship did a quick wing-over and skidded into the bushes.

The Waco floundered for an instant as Jim Barry struggled for control. He jammed on the throttle and the motor responded, but the effort was too great for the sturdy Waco and its courageous pilot. Its crippled wing sagged, and the landing wheels dragged on the brush tops.

Seeing the futility of it all, Barry cut the switch and yelled: "Look out!"

He jerked up his nose, the ship lost speed, then *crash!*

Luckily, the men in the rival plane were not badly hurt in their crash. They got out and ran over to the wrecked Waco. But Jim Barry died before they could get him to a doctor. E. Burton Steene regained consciousness in a few minutes and his pictures scooped all others in the theatres.

Today Pathe news reels are still entertaining countless thousands of theatre-goers who know nothing of the dangers of getting the pictures.

Aircraft Workers Head Salary List

THERE is a lot of food for thought in the figures recently rendered by the Bureau of Census for the year 1929. The Bureau shows that the average airplane factory worker (not aviator) received a trifle over $1,907 for his year's labor in 1929.

This is just $601 more per year than the average factory worker in other lines which stands at $1,306 and some cents. In some of the industries the average goes way below $900.

Without getting too statistical it is interesting to note that the airplane manufacturers of the United States paid a total of $18,804,527 to their employees and that this labor produced materials listing at a total of $61,973,079. This stands in advance of a whole lot of much older manufacturing enterprises.

One reason for the high salaries paid airplane workers lies in the fact that the airplane mechanic is still a craftsman or a skilled specialized worker, while in other industries the trend toward standardization and automatic production has opened the trades to less skilled men with a resulting drop on the wages. There will come a time in aeronautics when the same principle will apply but that time is apparently a long way off.

At present, the average mechanic working in an airplane factory must know something about airplane construction and principles, but this does not apply to the automobile factory mechanic who might just as well be working on roller coaster parts as on automobile specialties so long as he is working on the same type of screw machine, turret lathe or similar machine. It is the specific knowledge of the product taken as a whole that holds up the wage scale.

XUM

The Mead Challenger

HAVE you ever tried gliding at night? This Mead Challenger is equipped for night flying for it carries complete navigation lights in addition to a turn and bank indicator and airspeed meter.

The newest Challenger has a span of 38 feet, five foot chord, length 18 feet 4 inches and weighs 218 pounds empty. Its grinding ratio is 18:1.

The Challenger may be bought complete, finished in any color combination for $575. For those who prefer to build their own gliders, a knockdown kit is available at $175.

Student's Idea Impractical

WHILE acting as instructor for a flying school in Topeka, Kansas, a few years ago, W. E. Proach encountered a student with a most unusual idea about flying an airplane.

This student, a young man, hailed from a farm and was about to be sent back to his plow bearing the stigma of being an impossibility in a cockpit when his instructor discovered, accidently, the cause of his inane habit of keeping the right wing low in straight flight despite hours of instruction.

Proach had turned the lad over to other instructors for check hops but all had reported him as stubborn in his habit of flying and insensible for him to continue taking instructions if he could not adjust himself to level flight. No thought was given to the ship he was flying as other students assigned to that particular plane experienced no handicap of unstability in the craft.

It happened that one day Proach was giving his ship a superficial inspection and his attention was attracted by a lump in the center of the drift wire on the right wing of the plane. Upon closer inspection he found it to be a wrapping of adhesive tape.

A quiet investigation was started at once for there was no apparent reason for the tape being on the wire yet it obviously served a purpose. His suspicions aroused, Proach called the student to task about it.

"Why, sure," the farm lad replied, "I put it there. You see, I figured that if I kept that tape on the horizon the ship would be level and, besides, all that I would have to watch would be that one side of the plane."

Although not practical, the idea was original. The student soloed later.

College Fraternities Speed Invitations by Plane

UNIVERSITY OF COLORADO fraternities defined "collegiate rushing" in 1931 terms near the end of the school year. Not content with methods of former years, two of the national groups on the Boulder campus staged an airplane race to Denver to deliver "rush week" invitations to Denver high school boys. Phi Gamma Delta and Phi Kappa Psi each had a chartered plane waiting at Boulder Airport at 8 a. m., when the invitation cards were released from Mackey Hall, on the university campus.

The "Phi Gams" got a jump on their rivals when Bernard Buster, 1930 football captain, won an automobile race to the airport, handing his fraternity's cards to Bob Nelson, freshman grid star, who was waiting in a ship piloted by Eddie Brooks. Bill Thatcher and Dick Martin of Phi Kappa Psi took off immediately after Brooks in a plane piloted by Capt. Ralph J. Hall.

Flying low, the two planes sped toward Denver in a "nose-and-nose" race. A strategic maneuver, however, enabled the Phi Gamma Delta plane to win. While the Phi Kappa Psi plane headed toward the Curtiss-Wright Field the "Phi Gam" plane flew low over the municipal golf course at City Park, where Nelson dropped his cards. White streamers attached to the package attracted the attention of waiting fraternity brothers on the ground. They made a rush for the dropping cards, hopped into waiting automobiles and began distribution of the invitations.

The Kellett K-2, the Newest Autogiro

THE recently introduced Kellett Autogiro, designated as the K-2, follows very closely the basic principles of the Cierva invention and its attendant performance characteristics, but has many items of individual development in its structure.

Most conspicuous is the side by side seating arrangement, which will appeal to the private owner. This arrangement permits easy conversation in flight, and, with dual control system, makes it a simple matter for one to learn how to fly the ship.

Little exhaust noise is heard from the cockpit inasmuch as the engine is equipped with an exhaust ring and tail pipe. There is excellent visibility, and the rotor system is placed high so that it is not interfered with even though one stands on the seat.

On the K-2, both engine and rotor are fitted with self starters; there is individual control of wheel brakes, complete instrument equipment, and a large baggage compartment. Among its individual design characteristics is the area of the fixed wing, which is of larger dimension than ordinarily seen on Autogiros. The proportion of the fixed wing of the K-2 with reference to the rotor diameter brings about a very desirable characteristic of constant rotor speed under all conditions of flight.

It is emphasized by the Kellett company that the K-2 has not been designed to compete with the airplane on a speed-performance basis. It has a top speed of about 100 m.p.h. In common with all Autogiros, its utility lies in its ability to land with practically no forward speed, to fly slowly and at low altitude with security, and to operate out of fields not usable by airplanes.

In this connection, the landing and tail wheels are provided with Oleo shock absorber struts which cushion the landing forces, as well as with low pressure tires.

The side-by-side seating and the unusually high turtleback are most apparent features of the new Kellett Autogiro.

The Nicholson Junior, an Attractive New Lightplane

This is the single place Junior on which the first tests were made. The production model will be a two seater.

THE new Nicholson Junior has just completed over 200 hours of test flight at the hands of its designer, Hugh G. Nicholson, Jr. This photograph shows the single place experimental model upon which all tests were run with the gross weight equal to that of the production model which is a two-place job.

The plane showed excellent flight characteristics on its tests and may be placed at the landing angle at any altitude with power off, and held in this position until contact with the ground is made, with a normal landing as the result.

The Nicholson Junior is normally powered with the Szekely SR3-O, but a Continental A-40 engine has also given satisfactory results. The plane is equipped with folding wings.

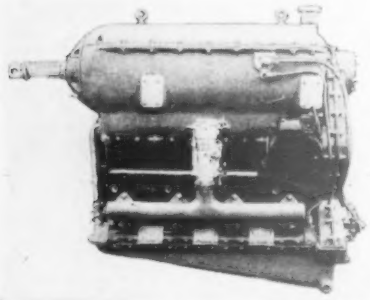
Specifications and performances data follow:

Span	37 ft.
Chord	66 in.
Length	23 ft.
Weight, empty	540 lb.
Gross weight	980 lb.
High speed	85 m.p.h.
Cruising speed	75 m.p.h.
Landing speed	28 m.p.h.
Climb	650 ft. per min.
Service ceiling	10,000 ft.
Gasoline consumption	2.6 gal. per hr.
Cruising radius	315 miles

Martin Introduces New Engine

THE Glenn L. Martin Motors Company has recently introduced the Martin 333, a four-cylinder, in-line, air-cooled inverted engine.

The manufacturers believed that no single improvement of any individual part was sufficient to guarantee the



performance of any engine, so by careful balancing and refining of all components, the result is a very efficient engine, judging from the performance figures submitted. The Martin 333 carries an approved type certificate No. 59.

The cylinders have a bore of 4.5 inch and a stroke of 5.25 inch, giving a displacement of 333 cubic inches—hence the name of the model. The normal horsepower is 120 at 2,100 r.p.m. with a fuel consumption of .48 pounds per h.p.hr. The weight of 265 pounds gives a weight per horsepower of 2.20 pounds.

Canadian Air Tour Planned

A SECOND National Air Tour will be held on the North American Continent this year with the holding of the first Trans-Canada Air Pageant starting at Hamilton, Ontario, on July 1 and concluding at the Canadian National Exhibition in Toronto on September 8.

A celebration will be staged at Windsor, opposite Detroit, on July 4, after which the "circus" will enter the United States through Selfridge Field and thence on to South Bend, Chicago, Minneapolis and Pembina to Winnipeg. The Canadian West will be toured to Vancouver, B. C., where the new Municipal Air Port, costing $449,000, will Forks and Chicago, the tour will make be formally opened with the arrival of the organized pageant.

Returning to the East, via Grand stops at all the principal air stations in Ontario, Quebec and the Maritime Provinces and will attend the National Air Races at Cleveland, Ohio, on "Canadian Day" before proceeding to Toronto, where it will be featured in a grand finale at "Aviation Day" at the Canadian National Exhibition.

The tour is being conducted by the Canadian Flying Clubs Association. A flight of Siskin fighters from the Royal Canadian Air Force will give a demonstration of aerobatics at each of the tour stops. Manufacturers, flying clubs and private owners are also entering machines and it is expected that upwards of 40 aeroplanes of all types will cover the whole route from Coast to Coast.

New Pursuit Job Tested

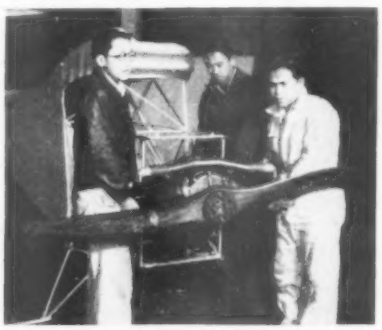
MAJOR TEMPLE JOYCE of the Berliner-Joyce Company, recently demonstrated a single-seat fighter at the U. S. Naval Air Station, Anacostia, after major modifications had been made. The airplane was tested at Anacostia several months ago at which time it represented the first of a new series of fighting plane types with which the Navy has been experimenting.

As a result of these tests certain major modifications were agreed upon, and it was the effect of these changes which Major Joyce demonstrated. In addition to the usual 10,000 feet dives, spins and acrobatics, the demonstrator flew the full length of Bolling Field on his side!

Chinese Students Build Their Own Plane

THIS view shows three Chinese students who are studying aviation in Portland, Ore. They were sent to this country by the Nanking government of China and upon the completion of their course will return to teach aviation.

They are shown installing a 2-cylinder motor in one of the smallest air-



planes in the world. The ship is being built entirely by them.

The ship will be unusual in many respects, as its entire weight will be less than 350 lbs. The motor weighs less than 100 lbs. It will take off at 20 miles an hour within 75 ft. Its ceiling will be 5,000 ft. and maximum speed will be 75 miles per hour. Its cost is considerably less than $1,000.00. It will be possible to learn to fly the plane in an hour.

Flying Clubs in England

GREAT Britain has 52 flying clubs, according to semi-official figures recently issued. Only about 30 possess and use airplanes. Some of the new clubs which can not afford to buy aircraft are arranging to hire them. With the aid of the government subsidy some of the clubs offer instruction at low rates.

Dual instruction may be had at one club for $7.20 per hour, and it is possible to learn to fly and to pass the air ministry tests for a pilot's certificate for less than $121.50 at many clubs.

XUM

My First Parachute Jump

"In a way, I did feel silly to jump so unnecessarily. But I was determined to go through the experience at least once in my flying career."

by
ANN BOHRER

ARRIVING at the airport, I was breathless with subdued excitement. I was going to learn what it was like to "bail out." I was taking advanced flight training and some day, perhaps, I would be forced to join the famous "Caterpillar Club."

An aerial circus was on the program and this was also amateur day for parachute jumpers at the Rankin Airport. Promptly at one o'clock the students who had signed up to jump flocked about an announcer who stood upon an elevated platform. A hat in his hands contained numerous slips of papers upon which were written the names of the students who wished to jump for the first time. We were all anxious to know whose name would be drawn first.

After what seemed to me an endless time, the announcer reached in the hat, pulled out a slip of paper and called a name—my name! Surprise mingled with relief as the suspense of waiting and wondering when my turn would come was over. I then knew I was to be first.

In loud tones the announcer introduced me to the awe-stricken throng, saying I was to be the first to make a parachute jump which event was to open the show for the day. Being a girl, I probably drew more attention than any of the fifteen or sixteen boy students who would soon make their initial jump.

As I scurried off toward the hangar to don a harness over my flying togs, I was acutely aware of hundreds of eyes following me. Looking at the many faces peering at me, I saw various expressions—surprise, admiration, awe, curiosity and disgust. In a way I did feel silly to want to jump so unnecessarily but I was determined to go through the experience at least once in my flying career.

Frank Brooks, famous world champion chutist, was busily engaged folding parachutes amid a crowd of curious spectators. Approaching them with my harness securely strapped on, I was for the first time the cynosure of all eyes. No wonder Lindy hated all this attention! It *was* embarrassing, to say the least.

As the crowd parted to allow my admittance to where Mr. Brooks was on his knees folding a huge red chute, I stated with embarrassment that I was picked first on the list. A broad grin spread over his face at this and he regarded me with genuine amusement much to my discomfort.

This was the day he had been waiting for so long. I knew only too well he remembered my vehement outburst of refusals to jump just a few days previously. Drat the man anyway, why did he insist upon grinning so and,

Ann Bohrer and Tex Rankin

why, he was openly laughing at me! I shifted uneasily from one foot to another while the crowd looked on. Mr. Brooks continued to pat folds of silk and he continued to grin. This was indeed a day of victory for him and he was, apparently, not slow in taking advantage of it.

There were many "kidding" remarks from various people who took great delight in teasing me. Some said that the harness did not look very strong and others said they had noticed a rip in the chute when Mr. Brooks was folding it. I was beginning to grow very impatient at the long time it took to fold the chute. Finally Mr. Brooks wiped a damp brow and stated that "that was that."

After a few brief instructions as to how to climb out on the wing, where to hold on, how to step off and how to land, a photographer asked if I would "kindly step this way, please and would Mr. Rankin (who was already in the cockpit), please look in the direction of the camera?" Among shouts from the crowd to "Smile, please," a camera clicked faintly.

I CLIMBED into the ship, Frank Brooks following. The chute was placed on my lap. To my surprise all of the excitement I had experienced just before had entirely disappeared. I might have been just one of the curious and milling throng. As we taxied onto the runway, I answered the many waving hands in that multitude of people with a wave of my own.

As our wheels left the ground, I raised my arm in a final farewell. I did not wish them to think I was the least bit frightened or apprehensive. I had entire confidence in what Frank Brooks and Tex Rankin told me regarding the safety of the parachutes. I thought as long as the chute opened, I would not mind the landing. I was to remember this a little later.

After flying about for some time obtaining the necessary altitude, testing air currents, etc., the plane was turned into the general direction of the field. Deciding everything was now in readiness for my abrupt departure, Tex began stalling the ship.

Looking over the edge of the cockpit at the vast panorama below, the idea of stepping off into space did not exactly appeal to me. A voice shouting in my ear suddenly penetrated my chaotic thoughts. The voice was telling me I could now climb out on the wing. Without any hesitation I climbed out over the edge of the cockpit, grasping a strut for support. I was thinking the sooner I got this over with, the better I would like it.

With Mr. Brooks kneeling on the seat and steadying my chute and Tex bracing my back with one hand, I slowly wormed my way back to the trailing edge of the wing until my heels extended over its edge and my hands grasped the edge of the rear cockpit. In this position I remained for several minutes.

Every now and then Tex would smile reassuringly, telling me not to be frightened and to "just step off when we tell you to." He advised me not to look down but to keep my eyes on the ship, explaining that in doing this, there would be no "sinking sensation" in stepping off. Instead, it would seem I was remaining stationary in mid air while the plane suddenly veered upwards. I promised to do this but found my eyes riveted instead to Mr. Brooks' lips, eagerly awaiting his command to "step off."

Would he never say, "All right, step off?" Now he was going to say it! His lips were beginning to move. But no, he just moved them for no reason at all. Why did he do that? How silly of him! He didn't say a word. I drew a deep breath and continued to watch those lips until my watchfulness became almost an acute pain.

Ah, his lips were moving again—his head, too. I was to go! "That's right! Let go and step backwards."

Aoof!! Down-down-down, feet first, now flat on my back, now my head was

dropping, my stomach moved into my throat and my eyes closed in spite of my good resolution to keep my eyes fastened on the ship.

My senses swam. I hadn't thought it was going to be so bad. Everything blank for a second. Then my first thought as I was being hurled through space was why were my eyes shut? Hadn't I meant to watch the ship? How foolish of me to forget. Such an insignificant thought at such a critical moment!

Opening my eyes, I took in with one swift glance my booted feet above me, then the long shroud lines and the parachute following me in one long straight line as I rushed toward earth. A hurried glance about for the ship I had just deserted and now could not find, I again turned my attention to the chute which was now slowly filling at the top. How thrilling to watch!

Now—puff!! Open all of a sudden, such a beautiful big red chute. How pretty it looked glinting there so crimson in the sunlight! My jaws clamped together hard as a vicious jerk yanked me into an upright position. Now it twisted me swiftly as the shroud lines straightened.

Why, what's the matter? I was going up instead of down, wasn't I? No, I was standing still in mid air. Was I too light to come down or did all parachute jumpers hang suspended in one place so long? Why hadn't I asked about that? I should have used a smaller chute so I would come down. Would I drift off to Seattle or would I land in the city all right? The earth seemed closer now. In fact, it came faster momentarily.

FLOATING over the airport, the white faces of thousands were upturned wondering as I was, where I would land. There was a big creek, there were the golf links and over there dense trees. Afraid of landing in the water, I began pulling on my shroud lines. No, that seemed to swing me in the wrong direction. Better try the other side. Oh, more water and drifting right toward it! Yanking another line I began swinging precariously. I now decided I knew less than nothing about controlling my direction and would allow my chute to decide my landing place.

I was drifting way past the airport and now headed toward the dense woods a mile or more beyond. The ground was now rushing up to meet me. I swung over a herd of cattle who eyed my bright red chute with keen disapproval and over heads of horses who also objected to the red chute.

Now I must remember to land on my toes but it looked as though my terra firma was going to be the dense willows and trees right ahead. I couldn't recall Mr. Brooks telling me how to land in the trees. At least, I was sure that the advice of landing on my toes would not hold good here. What was I to do? It was too late to decide.

The willows were rushing madly up at me. Was I going to get hurt? I'd probably have a bloody face when the limbs scratched me. Oh, oh, a 2x4 clearing right at the foot of the trees. I smiled at the thought of the landing I was soon to make and which I knew was going to be a hard one.

Sure enough, geplunk! Smack on my face, sprawled out headlong over the twig-strewn ground, my chute floating on above me and coming to rest in huge crimson folds over the tops of the trees. Lying there on my stomach with my face buried in twigs, moss and leaves, I felt too silly for words. Such a ridiculous position to be in!

"Look pleasant please." Ann Bohrer just before taking off for her first parachute jump.

I was laughing so heartily it was with some difficulty that I managed to unstrap the parachute from my harness so I could rise to my feet. But I knew I must do so at once to wave to those in the planes which had been watching my descent and which were now circling lower and lower.

Scrambling to my feet as fast as possible, I waved both arms in wide circles. The planes dipped and zoomed, then straightened out into level flight. Being certain any fears they might have had as to my well-being were alleviated, I sat down and laughed some more. What should I do?

Should I leave my chute and return to the field or wait there for help? It would be about fifteen or twenty minutes before help would arrive, but the chute was too heavy for me to carry alone, so I decided to wait. Probably, too, if I left the chute, I would be unable to lead anyone back to it as the trees and brush were extremely dense.

Finally, I thought I heard voices and the breaking of twigs in the distance. Help was coming at last. Poor fellows, I bet they were "all in" rushing out to me such a great distance and probably wondering why I didn't jump sooner so as not to land so far from the field. They were calling out now and I returned their call to let them know I was not injured as they might think. This would also lead them to where I was gathering up with the chute.

After calling back and forth several times, the willows near me suddenly parted and into my little 2x4 clearing stepped one of the boy students red of face and breathing hard. His face was covered with perspiration, but now a smile lit his features as he took in the scene before him. At least I was unhurt despite my surroundings. Now another student came panting through. They said they almost despaired of finding me in the dense undergrowth.

Gathering up the chute, we took turns about carrying it back to the airport. Sometimes we stumbled into vine-covered ditches, now and then branches would slap us smartly in the face. Following the two boys and carrying one end of the chute, I closed my eyes, the tug of the chute in front guiding me. I suppose the young man ahead carrying the other end of the chute wondered why it suddenly became so heavy.

Out of the brush now and down on our stomachs we wriggled under a barbed wire fence. Oh, there were those cows! I hoped fervently that our red chute would not be too distasteful to them. I moved a bit faster, keeping a sharp lookout for any suspicious moves on the part of the bovines. Now over a potato patch. Way in the distance loomed the airport.

As we neared it, a car drove towards us, picking us up and driving three tired humans back to the anxious crowd, which by this time must have numbered close to eight thousand. Later I learned that as soon as Mr. Brooks landed he explained to the crowd that it was not due to fright that I did not jump sooner and thus avoid landing where I did, but because he had erred in his judgment of the wind direction.

So as we drove up past the lines, cheers greeted me and for the second time I was introduced with flowery words amid much applause. Again I thought of Colonel Lindbergh and could sympathize with him. It surely was embarrassing to stand way up here on this platform while thousands cheered me. I did not feel so "plucky" down here. In fact, I felt more comfortable as I made my dizzy descent a moment before.

At last, everything over, even the shouting but I would never forget it. My first parachute jump!

Hide Bruised Pilot from Plane Prospects

APPEARANCES are sometimes deceiving. Jack Wilson, who is selling planes at Glendale, Cal., left his firm's showroom and started out to give a demonstration to a prospect. In the middle of the street, Wilson became confused by the dangers of highway travel and was struck by an oncoming truck.

The next morning he appeared at the sales meeting much the worse for wear and was kept behind closed doors on account of the psychological effect on airplane prospects.

XUM

Curtiss-Wright Loses Patent Suit

ONE of the most important legal actions in the world of aviation during the past few years—probably, indeed, since Mr. Esnault Pelterie's claims for compensation for use of the universally employed "joy-stick" or control lever—is now settled.

Mr. S. R. Worley, chairman of Handley Page, recently announced that the Curtiss Airplane and Motor Company, against whom proceedings had been instituted for infringement of the Handley Page slotted wing patents, had agreed to a consent decree of the United States District Court admitting the infringement and acknowledging the validity of the British company's patents.

The American firm has also entered into an agreement to pay royalties on any machines built by them to which slotted wings are fitted.

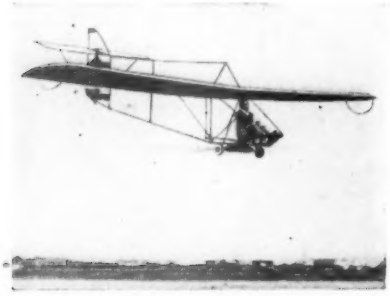
342 New Planes Built

THE number of aircraft built for domestic civil use during the first quarter of 1931 was 342, which was an increase of 89 over the number manufactured for that purpose in the final three months of 1930.

The 342 planes included 236 monoplanes, 95 biplanes, 9 autogiros, 1 helicopter and 1 sesquiplane. Of the monoplanes the majority were landplanes of the one or two place open cockpit types, and of the biplanes, the majority were either two or three place open cockpit landplanes.

Rocket Glider is Tested

BEFORE a crowd of 2,000 spectators, William G. Swan, Atlantic City, N. J., aviator, successfully flew his rocket glider in the face of adverse wind conditions. The glider, equipped with two sets of rockets, six to a set,



The rocket glider in flight. The rocket case may be seen just below the pilot's seat.

was trucked from a hangar onto the field and the rockets set off from the cockpit.

Although a strong wind was blowing, Swan took the craft up to a height of about 200 feet, and attained the speed of about 35 miles an hour, bringing the plane back to earth in a graceful landing. Each rocket carried a "pushing" velocity of about fifty pounds.

World's Non-Refueling Duration Record Broken

Left, the Packard-Bellanca plane which broke the world's record. Below, Pilots Lees and Brossy.

THE United States again holds the world's non-refueling duration record. This much sought record was taken from France on May 28 when Walter E. Lees and Frederic A. Brossy landed at Jacksonville Beach, Fla., with their Packard Diesel powered Bellanca plane after having been in the air 84 hours and 33 minutes.

France had been able to wrest the honor away from Italy when Bossoutrot and Rossi succeeded in getting off the ground in Algiers with a load of 1,650 gallons of gasoline and 79 gallons of lubricating oil and remaining aloft for 75 hours and 23 minutes.

As an interesting comparison the Packard-Bellanca plane took off with only 481 gallons of fuel oil and 41 gallons of lubricating oil. The American ship left the ground after a run of only four-tenths of a mile. Its gross weight of 6,715 pounds was nearly a ton less than the calculated possible gross weight of the ship.

Lees and Brossy, both of whom are test pilots of the Packard Motor Car Company, returned the record to this country in their third attempt. In their first flight, after some 30 hours a crack developed in the lubricating oil tank, forcing them to descend. In the second attempt they had beaten the American record by more than 14 hours and were within only a little more than two hours of beating the world's record when a black line squall forced them down.

Many features of the flight were of more than ordinary interest. Perhaps chief among these was the renewed world wide interest generated in the Packard Diesel aircraft engine and the demonstration offered of the inherent fuel economy of a Diesel aviation motor.

It undoubtedly was the first time that pilots carried with them an open flame stove on which to make tea and coffee while on a non-refueling duration record. No thought either was given to the smoking of cigarettes in a ship loaded with enough fuel for more than ninety hours of flight. There was no fear of fire such as would have prevented like comforts with a gasoline loaded ship.

The ship used in the flight was a standard Bellanca Pacemaker, a six-place monoplane which had been fitted to carry the fuel cans in the cabin and the wing of which had been carried out to a span of 55 feet, giving a wing area of 371 square feet.

The engine was a standard nine cylinder air cooled radial Packard Diesel Motor. It was the same engine that had been used in the two previous attempts and with the three flights and the load carrying and other test work which preceded them it has had more than 300 hours of running.

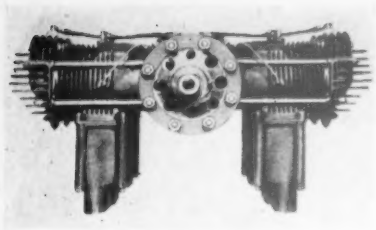
Flyers Get Pinched for Blocking Traffic

TWO California fliers have been placed on the horns of an unusual dilemma as a result of a forced landing which took place near Pasadena recently. The pilots, Nick Leontinine and Harl LaFarge, flying in a dense fog at 3 a. m., became confused as to their location and set the plane down in the center of Honolulu Avenue in Montrose, a suburb.

Had the landing been fifty feet to either side of the spot chosen, heavily wooded hillsides would have made a bad crash inevitable. As it so happened, the plane landed in the middle of the wide boulevard and was undamaged. However, with the coming of daylight the fliers were handed a traffic tag for blocking traffic, and were simultaneously forbidden to move the ship from the spot pending an investigation of the landing by Department of Commerce inspectors.

Governmental red tape bound them to the spot, inasmuch as they refused to jeopardize their pilot licenses by disobeying the inspectors' orders and removing the plane from the street despite insistent orders from the police department to do so. The police were helpless, however, in the face of the Commerce Department officials, and had to content themselves with issuing the fliers a traffic tag for illegal landing and for blocking traffic.

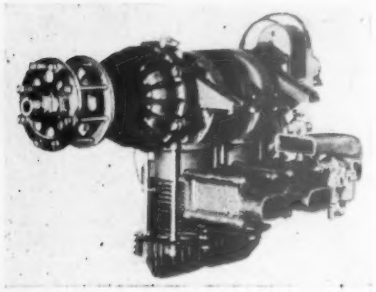
Three New and Unusual Lightplane Engines



The Tiger Junior.

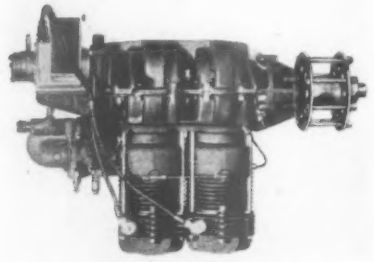
THE Light Manufacturing and Foundry Company are producing an interesting series of lightplane engines. The Tiger Junior 50, Tiger Kitten 30, and Tiger Kitten 20 comprise the series, their horsepowers being indicated by the model number.

The Tiger Kitten 30.



Most of the major parts of the three engines are interchangeable, the cylinders being all the same and having a bore of three and three-quarter inches and stroke of three and a half inches.

The Tiger Junior is a four cylinder, double-opposed, horizontal, air-cooled engine. The prop is driven at 1500 r.p.m. through a two to one reduction gear. The Junior lists at $475.



The Tiger Kitten 20 is the same as the Model 30 but without the reduction gear.

The two Tiger Kitten models are two cylinder, in-line, inverted, air-cooled engines. The model 30 carries the reduction gear and sells for $295, the model 20 is a direct drive engine, and is listed at $225.

A 15% increase in propeller efficiency, due to the reduction gearing, is claimed for these engines.

The U.S.S. Akron—What Good Is It?

WITH the first flight of the huge dirigible Akron (ZRS-4—Zeppelin rigid scout No. 4) soon to take place, the questions arise in the minds of most persons, "What is to be done with it? What good is it?"

According to David S. Ingalls, assistant secretary of Aeronautics, the ZRS-4 is intended as a scouting vessel. Its value may be best understood by comparing it with cruisers, the long distance scouts among surface ships. To construct a modern cruiser requires more than three years and calls for an outlay of about $15,000,000. A dirigible of the type being built at Akron may be constructed in less than a year at a cost of $2,500,000.

On the other hand, a cruiser's useful life is about 20 years, while the airship's probable career will not exceed much more than 10 years, according to estimates. To man a cruiser about 60 officers and 550 enlisted men are required, whereas the dirigible's crew is to consist of a dozen officers and 60 enlisted men. The annual operating costs are upward of $800,000 for the cruiser and upward of $500,000 for the airship. Their top speeds are 34 knots for the cruiser and 72.8 knots for the dirigible.

In the matter of armament, the balance is somewhat in the cruiser's favor, though the dirigible's high speed and maneuverability lessen its armament needs. Cruisers carry a variety of guns to those of the eight-inch type, while the armament planned for the ZRS-4 calls for sixteen .50 caliber machine guns; except for bombs, which cannot be considered as defensive armament. The dirigible, however, will carry five single-seater fighting planes. These can be used for defense or offense; and while the number does not compare with that carried aboard a surface carrier, the mobile base provided by the airship is capable of much greater speed.

There is no justification for bringing a dirigible scout close enough to a surface ship to be within reach of its anti-aircraft guns, and since helium escapes very slowly the loss occasioned by machine gun bullet holes, even hundreds of them, would not be materially great, from a navigating standpoint, for many hours. Neither is there justification for the dirigible crew not sighting a surface carrier as soon as the surface carrier sights the airship.

Thus, the big air scout might turn and run, gaining a long lead before the surface carrier's planes could get off; or it might defend itself with its own planes and machine guns. With reasonably good visibility, the airship scouts over 200 times the sea area that a cruiser can cover in the course of a day.

English Clergyman Passes Pilot's Exams

THAT the pilotage of the modern light aeroplane is not an occupation suited only to the young man and woman has been amply demonstrated lately by an English clergyman, the Reverend John Pyddoke, rector of the parish of Pleasley, in Nottinghamshire, and his wife. Mr. Pyddoke, who is 61, and Mrs. Pyddoke, aged 52, qualified for their pilot's certificate on the same day, which happened also to be their silver wedding anniversary.

Mr. and Mrs. Pyddoke have been in training off and on for the last eighteen months. Mrs. Pyddoke first flew nearly two years ago, and she persuaded her husband to take up flying. Now Mr. Pyddoke is considering the purchase of an aeroplane for his own and his wife's use.

Happy Weigrand's Adventures Witn a Rattler

IMAGINE yourself cruising along through the clouds, thousands of feet above the earth. Then suddenly, although the sky is just as blue, the sun shining just as brightly, the motor still purring sweetly as before, that sixth sense which so often warns you of impending danger sends a thrill of fear through you. And, looking down you see a huge rattlesnake on the floor of the cockpit!

Immediately you would wonder what to do. How many would follow a course like H. E. Weigrand, Oakland, Kansas, aviator, who found himself in just such a fix recently?

Mr. Weigrand, better known as Happy, is a salesman and frequently covers his territory by plane. This day he was some thirty minutes flying time from the nearest landing field and he had no parachute!

Now while farther south the rattlesnake is sluggish and consequently less dangerous, the Kansas variety is notoriously aggressive and venomous. Weigrand, realizing he must keep one hand on the controls, racked his brains desperately. The snake was striving to coil but seemed to be having a hard time to do so. Happy knew if he could prevent the coiling he would be safe. In his pocket was a box with fifty tacks. And thus started a battle of wits against a Kansas rattlesnake.

"I'll show you what happens to stowaways in my plane," he murmured to the snake.

The reptile answered with an ominous rattle and started to coil. Happy promptly dropped three tacks on the snake's back. Stung by pain, the rattler straightened out. Happy felt confident now that he could control the situation as long as the tacks lasted and the snake continued to consider its own comfort.

Again the serpent started coiling and again a tack fell on him, this time on his rattle. Mr. Rattler indignantly

(*Continued on page* 57)

XUM

Novel Ways to Catapult Your Glider

Auto towing or shock cord methods are not the only means of flying gliders. Here are some suggestions that make glider flying a one man sport.

by J. B. ROBERTS

IT IS the accepted idea at present to launch a glider with a rubber cord "sling-shot," a method that seems very crude and one that requires the services of five or six assistants to get the glider into the air.

If such assistants, and trained assistants at that, were always available the matter would not be so bad. But such is not the case.

To avoid the necessity of towing a glider by the methods now in fashion, three different proposals are described and illustrated in this article. At least two of them have proved successful in practice, and all of them are so constructed that the pilot can launch his own glider without seeking outside assistance. Further, he is insured of a straight launching and not a skew-gee catapulting that frequently occurs even with the most experienced of tow men at the cord.

In Fig. 1 is the inclined slide consisting of a wood runway inclined at a suitable angle, and a wheeled "dolly" or small wheeled truck that runs down this track until sufficient speed is attained to lift the glider off the dolly. A pit is dug at the outer end of the

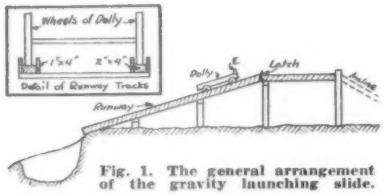


Fig. 1. The general arrangement of the gravity launching slide.

runway for the reception of the dolly after the glider is launched.

Near the horizontal platform, and at the beginning of the runway, is a trigger or latch that holds the dolly in place until it is released by the pilot. If the length of the runway is such that it stands up at a considerable height above the ground, then an incline must be added at the rear for rolling the glider up on the platform as indicated by the dotted lines. This can be easily built by any one familiar with the working principles of a hammer and saw, and who can get a few rough boards at a reasonable figure.

The angle should be slightly sharper than the natural gliding angle of the machine. Its length should be sufficient to insure the proper speed when the glider is headed into the wind. However, it has the disadvantage of being a stationary fixture and can only be used when the wind is in exactly the proper direction, which in any case, should be against the direction of the prevailing wind in that locality.

Above Fig. 1, is a section taken across the runway showing how the tracks are constructed. At the bottom is a 2x4-inch stud with one inch boards nailed to the sides for guiding the wheels of the dolly. The tracks are tied together at intervals by cross-pieces of almost any convenient size of lumber.

A COMBINATION of the shock-absorber cord method and runway is illustrated by Fig. 2, a scheme that gives a much more compact runway, and one that is adjustable to wind direction. Here we have the wheeled dolly or truck before described, running along a wood runway of the same type. However, this runway is horizontal, and the dolly is propelled by a rubber shock absorber cord run over the pulley at the outer or left end, and then back to a windlass by which the necessary tension is given to the cord.

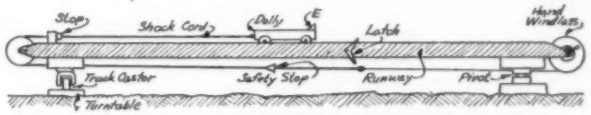


Fig. 2. A suggested shock cord launching runway.

In starting, the dolly is run back to the right until the latch is engaged, holding it in place, while the tension is created in the cord by cranking the windlass drum. The pilot now takes his seat, and at the instant that the wind velocity is correct, he releases the latch and is catapulted toward the left by the tension of the absorber cord.

An innovation is adopted in this case which will prove of advantage in practice. The runway is pivoted at the right by a long bolt so that it can be swung about this point, while at the left is a truck castor wheel running on a board track. Thus, this catapult can be turned into any direction on top of the hill to meet any wind direction, and is therefore completely a "one man" operation.

Where it returns beneath the runway, the cord runs through a hole in a wood block shown at "Safety stop." This prevents the cord from snapping back and causing damage if it should slip off the latch on the dolly or break at any point. Knots tied at the proper point in the cord will prevent the cord from snapping through and back to the windlass. While this catapult is somewhat more complicated than the runway above, yet it is simple and inexpensive to build.

In Fig. 3 we have an adaption of the old Wright Brothers' catapult that so faithfully served them in their early experiments. In this catapult, the dolly and glider are propelled by a falling weight in a tower instead of by the shock absorber cord in the previous figure. The tow rope is attached to one end of the dolly, passes over a pulley, and then back to the top of the tower where the other end of the rope is attached to the weight. On releasing the latch, the weight is released and very rapidly drives the glider toward the left.

A stop is provided at the end of the runway, for stopping the dolly. For retrieving the dolly, or bringing it back to the starting point, a second rope (Indicated by dotted line) runs back to the hand windless by which the weight can be cranked up the tower for a second start. In cases where a long runway is advisable it may be necessary to use a block and tackle at the top of the tower for multiplying the motion of the weight. Thus, a two pulley block-and-fall will move the glider two feet forward for every foot that the weight drops in the tower. This reduces the height of the tower.

The velocity of the glider at the end of any of the three runways should be more than sufficient to lift the glider off the dolly. It is better to have the glider rise before the end of the run, so as to leave the dolly free and empty before it falls into the pit or comes up abruptly against the stop. This in turn depends upon the average speed of the wind against which we must launch the gliders.

If it is intended to launch gliders in calm air, then it is evident that the speed must be greater and the runway must be longer than when gliders are launched against winds of ten miles per hour or more.

The runway of Fig. 1 would necessarily be longer than the runways of the two catapults for the reason that the gravity start would be slower than with an elastic cord or weight. Probably, the gravity runway would be in the neighborhood of 75 to 100 feet long

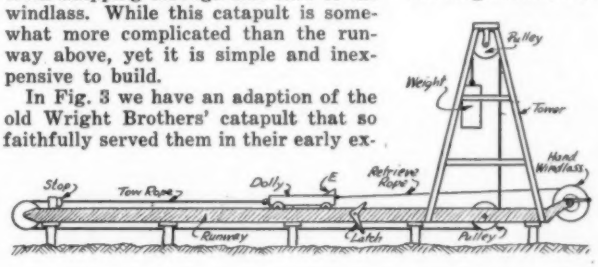


Fig. 3. An adaptation of the Wright brothers' catapult making use of a falling weight to launch the glider.

for calm air launching, or about 50 feet long if all launchings were to be performed against a strong breeze as they generally are.

By the use of sufficient tension in the shock absorber cord, or by a heavy weight, the catapults would probably launch a glider within 20 to 30 feet. This is easily determined by watching the number of feet traveled by a glider when launched by towing, and then shortening this distance somewhat for the runway method.

In all methods, the glider rests on the dolly without restraint in a vertical direction so that it is free to lift off at any time. To prevent the dolly from being pulled out from under the glider, a small chock or block (E) is fastened to the dolly at the rear, the chock acting as the driving member.

The catapulting method of launching, by slow burning powder or compressed air is not available to the average glider fan, and from many standpoints it is fortunate. The sudden shock and impact of the powder charge necessary for bringing an airplane or glider up to full flying speed within a short distance, throws heavy stresses into the craft, and it must be specially designed to withstand these stresses.

'Chute Jumper Makes Three Mile Delayed Jump

WHEN a parachute jumper leaps out of an airplane and, because he wants to do so, falls three miles before opening his 'chute, he has plenty of time to think about a lot of things, according to E. S. Manning of Los Angeles, and he ought to know.

Manning is the 22-year-old youth who jumped from a plane at an altitude of 16,665 feet and didn't open his parachute until he was only 1,400 feet from the ground. "My biggest worry was to judge the distance so that I could break the record," he said.

Manning's recent fall of 15,265 feet nearly doubled the previous record of 9,600 feet set by Rex Harker of Cincinnati, Ohio, August 4, 1929. A barograph in a small box was strapped to Manning's body during the fall and it recorded the distance the jumper fell before releasing the ring on one of his two parachutes.

In speaking of his jump immediately afterwards, Manning said: "As I whirled around in space I looked up and could see the ship. I waved my hands at the boys I had just left. The wind whipped my face and filled my eyes with tears. The earth seemed to be coming up to meet me and then it would fade away.

"I kept my head and refrained from pulling the release cord, and at no time during the fall was I in danger of losing consciousness. Finally, the earth seemed to be close enough to touch. I pulled my release ring. When the parachute opened I was nearly jerked unconscious. I landed on top of an orange tree. If anyone beats my mark, I'll try it again."

Night Watchman Crashes a Curtiss Junior

CHARLES MURRAY, 20-year-old student pilot and night watchman at the Denver, Colorado, Curtiss-Wright aviation field, was tired of staying on the ground. It was 5:30 a. m. and none of the officials would be at the field for several hours, and by that time the thrill of an early morning flight would be gone. The possibility also existed that the field officials would deny him the privilege of taking a plane. Murray eyed a shiny new Curtiss-Wright Junior parked in the hangar.

"Who would be the wiser if I took the Junior up for a flight and then put it right back?" Murray thought.

The sight of the plane was too much for the air-minded youth, and he pulled the plane out on the field and took off. The flight was a huge success, Murray told Capt. Ralph Hall, the field manager, until he prepared to land, AND THEN—

Murray was within fifteen feet of the ground when he made a sudden turn, which caused the plane to nose dive. The youth crawled out from beneath the wrecked plane with a badly cut face and a wrenched shoulder.

New Army Bomber Passes First Test

The new Boeing bomber in flight. The plane is now at Dayton, undergoing army tests.

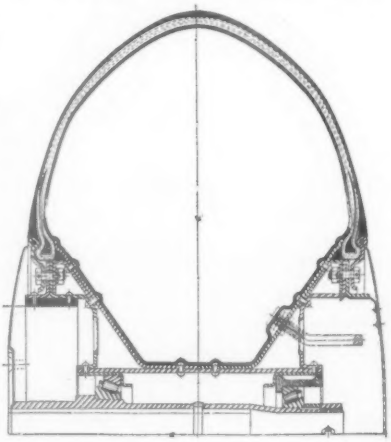
UNCLE SAM'S newest flying fortress, a giant bombing plane, received its first tests at Boeing Field the other day. The new "Death Angel" has a wing spread of 86 feet and is powered with two 576-horsepower motors mounted on the wings which are expected to drive the plane at a speed much greater than that of any other bomber and to give a full-load ceiling of 16,000 feet.

The new bomber is capable of carrying more than a ton of explosives, four machine guns fore and aft and a crew of five men. It carries two-way radio equipment.

New Balloon Tire Offers Better Streamlining

STREAM-LINED so that it presents much less resistance than any other existing type of airplane tire, the new General Streamline Airplane tire, which has been in development for more than a year, was recently announced.

The U. S. Army Air Corps co-operated in the development of this new type of tire, which was tested, under army air corps supervision at Wright Field, Dayton. Aerodynamic tests of



every kind, including wind-tunnel tests, were successfully passed, many with double the favorable result that had been anticipated.

In the general shape of a triangle, the narrowest part of the tire is at the tread. Uninflated, the tire is an exact triangle. When inflated with air pressure of only 10 to 15 pounds, it takes on somewhat more the form of a parabola.

The General Streamline tire is mounted on a new type of wheel never before used. This wheel is so constructed that it permits adequate brake equipment to be installed, an advantage not previously accomplished with low pressure airplane tires.

The bead of the Streamline tire is mechanically clamped to the rim of the wheel, making it impossible for the tire to pull loose from the wheel under stress.

As rapidly as possible, the new tire will be put into production to replace the 4-inch, 5-inch, 6-inch, 8-inch and 10-inch high pressure airplane tires. Tail wheels in two sizes will be produced.

Left, a sectional view of the streamlined tire. Below, the complete unit fitted to an experimental plane.

The Bearded Lady

THE airport, one of the finest in the middle west, was crowded with spectators. It was a gala day and thousands were on hand to witness the aerial maneuvers during the dedication services, formally opening the port to the public.

Special Attraction:
World's Oldest Woman Student to receive her first flying lesson at 3 P.M.

The above announcement was responsible for a large number of the visitors. Who was this woman anyway who wanted to learn to fly? Various rumors spread over the field as to her identity. What did she look like and how old a woman was she? Someone remarked that she was a widow of a wealthy Oklahoma oil man and had more money than brains. She was planning a non-stop solo flight across the Pacific. Another said she just wanted a little publicity before she died. One wise-cracker even intimated that she was an underworld queen, who wanted to be the first flying hostess of an aerial cabaret, where the prohibition officers could not intrude.

It was nearly three o'clock and there was a pause in all flying activities. Ships that had been flying were taxying to the side of the field and shutting off their motors. What was next on the program? A siren whined at one end of the field.

Somebody yelled, "There she is!"—and sure enough, down the concrete runway came a gayly decorated automobile driving slowly along past the crowd so that every one could see her.

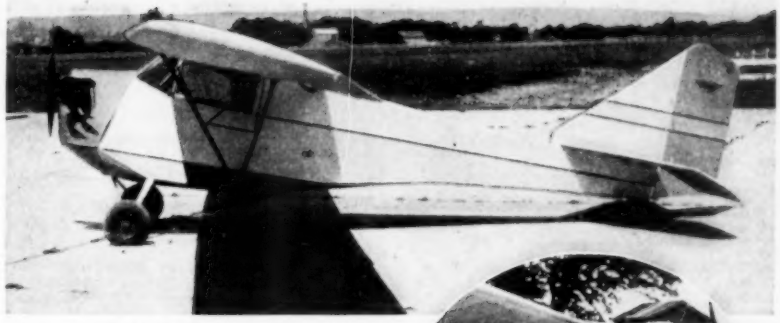
She was sitting in the rear seat with a pilot in uniform, her instructor to be. She was dressed for flying, in a black and white riding habit and boots. Her helmet was on and the goggles were already pulled down over her eyes.

Tufts of blonde hair, nearly white, were sticking out from under her helmet. She was not pretty; her nose was too big and she had too much rouge on her cheeks. Just the type to be so crazy at her age, someone remarked. She must be 60 if she is a day. But the crowd gave her a big hand anyway. She at least had a little nerve if she did not have any sense.

The drive up and down the runway over, she got out of the car and paused long enough at the judges' stand to be photographed. She waved and smiled at the request of the cameramen. Then the pilot adjusted a parachute on her and helped her into the plane—motor running and all ready to go. The safety belt was fastened around her waist. The pilot took a walk around the ship, giving it a last minute inspection.

Suddenly, while he was examining the rudder, the motor roared and the plane leaped forward. She had accidentally jammed the throttle ahead and the plane was gathering up speed! She could not jump out. She did not know what to do to stop the blamed thing,

(*Continued on page* 54)



The Eyerly "Whiffle Hen"—A Two-Place Cabin Job

THE Eyerly Aircraft corporation has recently brought out an attractive new lightplane which they have christened "The Whiffle Hen."

It is a two-place side-by-side monoplane, powered with a 40-h.p. Continental A-40 engine, and will sell for $1200.

Specifications and performance figures follow:

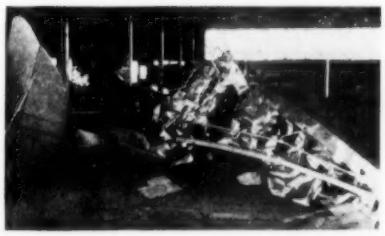
Wing Span	35 ft.
Length	18 ft., 11 in.
Weight Empty	485 lbs.
Gross Weight	890 lbs.
Pay Load	200 lbs.
High Speed	80 m.p.h.
Cruising Speed	68 m.p.h.
Landing Speed	30 m.p.h.
Cruising Range	250 miles
Gas Capacity	9 gal.

Curtiss Junior Crashes at Atlantic City

CAPTAIN JAMES J. RITTER was killed May 24th in an accident that occurred at the Atlantic City, N. J., Airport.

Ritter was an experienced pilot, formerly manager of the Johnstown Flying Service. The make of the plane he crashed in was a Curtiss Junior, powered with a Szekely motor.

Ritter was giving a demonstration flight of take-offs and landings and his



What was left of the Curtiss Junior.

plane stalled at an altitude of not more than one hundred feet. While in this position he either attempted a down wind turn or was turned down wind by a sudden gust. In the turn the Curtiss Junior mushed and he lost altitude so suddenly that he had no chance to level the plane off before it literally flew into the ground.

Navy Gets New Amphibions

THE Sikorsky Aviation Corporation recently delivered the first of three model S-41 amphibions to the United States Naval Air Station, Anacostia, D. C. This plane is the first of three delivered for manufacturer's demonstration and submission to the trial board of the Bureau of Aeronautics, Navy Department.

The S-41 is powered with two 525 h.p. Hornet engines, has a gross load of 13,800 lbs., a top speed of 131 m.p.h. and a passenger capacity of 16 persons. The Navy will use these ships for transport service.

Boeing Builds New Fighters

A CONTRACT for thirty fighting planes has been awarded by the Navy Department to the Boeing Airplane Company.

The planes, similar in general design to the Boeing Wasp-powered fighters built for the Navy and Army last year, will be produced for service aboard the Navy's aircraft carriers, and will be equipped with special arresting gear for landing on the decks of the carriers.

The new fighters, officially designated as F4B-3's, will differ from past models in that their fuselages will be of all-metal monocoque construction. This is said to be the first time any fighting planes have been produced for the Navy with such type of construction. They will be powered with supercharged Wasp engines.

They are single-seat fighters equipped with two machine guns synchronized to fire through the propeller, and they will also be fitted for use as light dive-bombers.

Is the BATTLESHIP

General Mitchell and his followers believe the battleship is obsolete—an easy prey to the air fleet. His opponents consider the battleship supreme and invulnerable. Lieutenant Commander Tomlinson gives an unbiased analysis of the situation which will surprise both factions.

by LIEUTENANT COMMANDER D. W. "TOMMY" TOMLINSON

Lieutenant Commander Tommy Tomlinson and his plane.

THERE has been a lot of talk, argument and not a few back-alley fights over the question as to whether the battleship has been rendered obsolete through the development of the air-bombing attack. No one can dispute the fact that since the late-lamented war more battleships have been sunk by peace-treaty "hot-air" than were sunk by legitimate means during the big headache of 1914-1918.

General Mitchell's hot-air force went hog wild on the flood tide of publicity; but notwithstanding their assertions, the fact remains that air bombers proved nothing except that a bomber flying at a thousand feet can, under perfect conditions, hit an anchored battleship—and that after the defenseless battleship has been hit often enough, it will sink!

The newspaper headlines which carried the momentous words "Bomber Sinks Battleship!" caused a stir all over the country. In every possible way this simple sentence was distorted and exaggerated to form the basis of an insidious propaganda, calculated to turn public opinion against the backbone of our navy—the battleships. Fortunately for the country, however, the move finally collapsed of its own weight.

Not many people have ever seen our battle fleet at sea during maneuvers. Naval gunfire at ranges of fifteen miles is a sight reserved for the very few within the service. As a matter of fact, the only persons who really get a clear picture of a long-range battle practice are the aerial spotters flying over the target. The men actually manning the guns never see the target at which they are shooting!

Here and there about the country bombing exhibitions have on occasion been put on by both Army and Navy—but the real experimental high altitude bombing tests which bring results are always conducted in strict confidence; and the results are known only to the inside few. In consequence of this, all that the public knows of aerial tactics is gleaned from such literature as "War Birds" or from such motion-pictures as "Hell's Angels"—and what actually goes on aboard a battleship is as much a mystery to the average citizen as is Einstein's theory of relativity.

It happens to have been my good fortune to spend some fourteen years in the Navy. As a midshipman I shoveled coal out of the upper bunkers of the old battleship Ohio on her way to the San Francisco Exposition in 1915. In 1922 I was senior watch officer aboard the U. S. S. Oklahoma (a first line battleship); and at the National Air Races in Los Angeles in 1928 I led the Navy's "Three Sea Hawks" in aerial maneuvers and led a Fighting Squadron in a simulated dive-bombing attack. So the Navy has afforded me unusual opportunity to become well acquainted with both sides of the controversy of Battleship versus Bomber.

The actual releasing of a bomb so as to hit a designated spot is in itself a neat little problem. Physics and mathematics tell us in theory how a bomb will fall and where it will hit under certain conditions. However, in actual practice the best of figures will not help to drop a bomb square on a target. Only a perfect combination of skill and luck can do this; and to secure a direct hit in aerial bombing one needs plenty of both, according to the conditions of the moment.

What do you suppose is going on in the ranks of the thousand or so men aboard one of the battle wagons about the time that a bombing attack came off? Would they be twiddling their thumbs in prayer meeting? Not if I know the Navy!

SINCE the War great strides have been made in the development of anti-aircraft guns. The five inch rapid fire anti-aircraft guns of today are no mean weapons. These large calibre guns are backed up with fifty calibre machine guns with an effective range of over a mile. Advancement has also been made in methods of aerial range finding and in a co-ordinated system of fire control against aircraft. Accurate range-finders for use against aircraft now give their range from the firing ship with nearly the same accuracy that the range of surface vessels may be determined.

The slickest gadget of all, however, is the automatic range-computer. This resembles the sort of machine into which one drops a nickel and is rewarded with a complete record of one's past life and the bad news concerning one's future condition of servitude. The automatic range computer gives accurate data concerning the range of the attacking planes. Their angular bearing in relation to the course of the ship (and their angle of elevation, at the moment of firing the guns), the

The U. S. S. West Virginia sinking after an aerial bombardment which "proves nothing except that a bomber can, under perfect conditions, hit an anchored battleship" which will sink if hit often enough!

DOOMED?

The true facts, by a man who has seen service with both battleships and bombers.

A view of the flight deck of the U. S. S. Lexington. The aircraft carrier will be one of the battleship's greatest aids in any future fight for sea supremacy.

estimated speed of the hostile airplane, its relative bearing and the speed and course of the battleship are dialed on the instrument. Inside the case, gear trains, integrators and what-have-you go into mechanical conference and pass out of a side door the straight dope on the actual sight-setting which must be put on the guns in order that they may make a hit. This data is placed on visual electric transmitting machines and, under the eyes of the sight-setter on each gun, appear continuously the correct sight settings for his gun. And this is not the half of it, either!

Not so very long ago, each anti-aircraft gun crew on a battleship was a unit in itself. The battery officer got his ranges over a voice tube from the fore top, where an officer made running guesses as to how far away the attacking planes might be. The gun pointers then cranked frantically on the manually operated geared mechanism, which elevated and trained the guns. Shrapnel fuses were set by hand. Anti-aircraft practice was a comic opera—with the added attraction that the pilot of a plane towing a target was in grave danger of "getting the works" himself and passing out in a cloud of glory. The towed sleeve, one thousand yards behind him, traveled along in comparative safety.

And now what a difference today! Gun pointers and trainers may not even see the target, except when the battery is being controlled independently. They "follow the pointer" instead of sighting at the actual target through a telescope.

There are two hands on two separate instruments, indicating the elevation and train of the gun. One set of these hands is controlled by a master gun pointer, who keeps the cross wires of a director telescope on the target. The other set of hands shows the actual elevation and train of the gun. A gun pointer and trainer keep the proper hands in coincidence.

All guns are thus really aimed by one highly trained and skilled man. This eliminates individual errors in sighting which would otherwise affect the individual guns in a battery of twelve or more. Two and sometimes four of these director telescopes are manned and any one of them may be placed in control of the entire battery, or any of its component groups, merely by throwing a switch.

Thus it may be seen that the Navy's pride—the Pig Iron Boats—are not entirely without defense from air attack. There is no truer precept in the fundamental principles of war than that a rigorous offense is the best kind of defense.

THE theory of the trajectory of aerial bombs may be worked either forwards or backwards with equal facility and accuracy. The bomber may automatically solve this problem through use of a sight which gives him the correct instant at which to release the bomb, in order that it may strike a given point. Certain variables must be known to him and correctly set on the sight bars. These variables are: speed of the plane, altitude, course of the plane, the direction and force of the wind and, if the target be a moving one, the course and speed of the target also.

Let us assume that the Fire Control Officer on board a battleship spots a group of bombers heading his way. By the use of range finders and bearing indicators he can closely determine the speed of the planes, their altitude and their true course relative to the ground. With this data in hand he can figure where they will have to be to release a bomb which will strike his ship—assuming that there be no change in course or speed of either ship or plane in the interim.

This latter assumption is a reasonable one, for in order to secure any degree of accuracy a bombing plane must fly towards a target on a steady course at a constant speed. It is therefore quite likely that Mr. Fire Control Officer is going to arrange a reception committee at this critical point in the heavens. Five inch high explosive shells in the form of a barrage pack a most potent wallop of their own. I remember on one occasion, while I was towing a target sleeve for the Battle Fleet, I had the experience of being almost jolted out of my plane when a shell went off unexpectedly about a quarter of a mile away!

This barrage of five inch shells would not be directed merely at one spot in which it was estimated that the bomb release might take place. The Navy is never stingy with its shells. The sky would literally be filled with exploding shrapnel on the course which the plane must fly in order to reach that one spot from which its bomb must be dropped with effect. Fuses on the shells of one group on the battery would be set to explode below the altitude of the attacking planes. Shells from still another group would be bursting on its level; and from a third group they would be popping off slightly higher. The possibilities of disconcerting the pilot of a bombing plane in this fashion are decidedly good!

Quite probably the bomber, or the formation of bombers, would do some plain and fancy sidesteps to avoid such a barrage. I grant you that they might successfully avoid the anti-aircraft—but in so doing they would also defeat their own purpose. Any honest gunner

A Navy torpedo plane drops its deadly missile during practice at Guantanamo Bay, Cuba.

or pilot who has done any bombing will tearfully admit under cross-examination that, except for the perverseness of Old Man Gravity, he couldn't even hit the earth if he released his bombs while his plane was turning!

There is no law of man or nature which requires a battleship to steer a straight course. Let us assume that a bomber is flying along at ten, fifteen or even twenty thousand feet—doing perhaps better than a hundred miles an hour. He has figured out the force and direction of the wind at that elevation to use on his sight setting. We will assume, too, that he guesses just right in this regard.

Now, anyone who has done much flying knows that from the ground up to about ten thousand feet there are several stratas of air blowing, with varying velocity and in different directions. It therefore stands to reason that the trajectory of the falling bomb is going to be affected in turn by each of these air currents—just how much no man can begin to estimate—but no matter how little, it may be just enough to cause a miss.

The bomb, let us say, has been released. Immediately the target ship changes its course—"zig-zagging" as it was called during the War. Even if the bomb hits at exactly the point at which it was aimed, the Pig Iron Boat may not be there to meet it! Unethical, of course, but quite likely to happen.

THERE is one kind of bombing, however, that will give the boys on the anti-aircraft batteries something to think about. And that is dive bombing.

Dive bombing is a fairly recent development. Fast maneuverable planes, capable of carrying several 25 or 50 pound demolition bombs, or one 500 pound bomb, launch their attack from high altitudes. They do not drop the bombs from this altitude—they dive straight at the object they intend to hit. Speeds of 250 and 300 miles an hour in such dives are not unusual. Using a telescope sight along the line of flight of the plane, the pilot aims his plane at the target. When still at an altitude of from one to two thousand feet, the bomb is released. This bomb follows, within narrow limits, the line of flight of the plane at the instant the bomb was released.

A surprise attack of dive bombers could raise a lot of Cain with a battleship's anti-aircraft defense. Fortunately for the ships, however, a dive bombing attack should be launched from high altitude to be effective. Any time that there is a high ceiling, or clouds broken sufficiently for such an attack to be started from above the clouds, there is good chance of the ship detecting the presence of such hostile planes before an attack could be launched. When the ceiling is low, and the weather so thick that planes can approach close enough to launch a complete surprise attack, the dives would have to be so flat that accuracy would be sacrificed. I have found in leading such attacks that weather conditions which are favorable to surprise attacks are unfavorable to effective maneuvering of the dive bombers.

In the next war a fleet at sea will have a constant patrol of air scouts covering wide areas on all sides of fleet formation. Any time that the weather will permit a bombing attack it will also be good enough for the protecting scouts to be on the job. When in the vicinity of an enemy fleet (or enemy air bases) either ashore or afloat in the form of aircraft carriers, these air scouts will be backed up by a defensive patrol of fighting planes, cruising high above the fleet formation. There is very small chance, therefore, of a bombing attack of the future be-

A view of the U. S. S. Lexington from 3,000 feet. At 15,000 feet it would make an almost impossible target.

ing a one-sided affair!

During the late Unmentionable, the Germans flew over London and other cities at night, dropping bombs with desultory effect. What a different story it would have been had they been looking for the British fleet at sea!

Let us suppose that a flight of hostile bombers could locate the fleet. In the darkness accurate bombing of the individual ships would be impossible. A bomber can hardly miss a city covering many square miles, but when the target is an object say a thousand feet long and a hundred feet wide, moving at thirty knots an hour, it is not so easy. The boys on the Pig Iron Boats need lose no sleep nights worrying about orthodox bombing attacks.

Consider a bombing attack by daylight. Suppose that there are eighteen planes in a group—each plane carrying two two-thousand pound bombs. Smaller missiles would not even scratch a battleship's back. Below these planes are twelve battleships, spread out in formation, awaiting the bad news—if any. The Squadron Commander of the bombing flight must divide his force, assigning to each plane, or group of planes, certain ships as their target.

The possible combinations or manner in which the flight may be arranged to drop the bombs are many. They may come over in column, each plane releasing a bomb as it passes over a certain ship. Or, flights of three or more planes may come over in formation and each unit drop its bombs on signal from the leading plane. This is called "salvo bombing."

If it is desired to concentrate on a particular ship, a whole squadron of planes may release a salvo on signal from the leader. Each plane may therefore be compared to a big gun with but two shells. When it has fired its two shots, it is out of the picture. The reloading of these aerial guns will require two to six hours—depending on the distance between the plane and its base.

I HAVE done a little bombing myself; some of the orthodox General Mitchell bombing and quite a bit of dive bombing. In the orthodox act, a large type bomber with a heavy load of bombs will attempt to release its bombs from as high an altitude as possible for two reasons: first, to avoid anti-aircraft fire, and secondly to secure the greatest velocity on impact in order that the bomb will penetrate the armored decks and explode in the ship's vitals. To the dismay of advocates of bombing it has now been proven that a 14 inch projectile, dropped as a bomb, can never—regardless of the altitude—gain the velocity in falling that it would have if fired from a gun!

A bomber will probably have a crew of from three to five men; two pilots, a gunner (who sets the sight and releases the bombs), a machine gunner for defense and possibly a radio operator. Bear in mind, however, that in order to secure any sort of accuracy, the plane must, at the moment the bomb is released, be flown exactly level and at a definite speed which has been set on the bomb sight. The plane must also be on an exact course and at an exact altitude. All these factors must be accurately set on the bomb sight.

And if you think that all these trifling detalis do not call for complete concentration on the matter in hand, you are mistaken. Blissful peace and heavenly serenity are the necessary surroundings for a really proper attention to the job of setting a bomb sight and for accurate bomb release. To obtain that in the maelstrom which will inevitably accompany the bombing of a fleet in the next war is just naturally asking for the impossible.

For one thing, about the time that the crew of the bomber gets its dope all figured out and are nearly steadied down preparatory to a run towards the target, our modern Archies will send up their cards. Love and kisses from the Pig Iron Boats!

The battleships may not get any direct hits, but it will be because the bombers have rapidly changed their courses when they observe the barrage coming toward them. This change in course, as has been pointed out, naturally throws the bomb sight all off, so that the bomber, if he wishes to hit anything, will have to pull away and start all over again in another ap-

(*Continued on page* 60)

XUM

Pilot-Saleswoman Makes Good

MRS. DOLLY BERNSON, sales-manager of the North Shore Airways, Inc., Arrow Sport distributors for eastern New England, sold four planes from January 1 up to May 15, this year. Mrs. Bernson flies and demonstrates her own plane and is believed to be the only woman sales-manager of an aviation concern in the country.

Plane Has Long Life

THE lifetime of airplanes at the present time is still a disputed question, as comparatively very little authentic statistical material is available as yet.

The following figures, taken from the log book of the Dornier Delphin D277, should furnish an interesting record of a flying boat in the air transport service.

The Dornier Delphin was built in 1923-24, and initially placed in service by the Aero Lloyd concern for night flying on the route between Stettin—Malmo—Copenhagen.

In the last seven years during the short summer seasons the following unusual record of traffic flights was attained.

Season	Number of starts
1924	160
1925	459
1926	1,252
1927	759
1928	1,317
1929	1,320
1930	1,445

Thus in seven flying seasons, it has made 6,712 starts.

The Delphin D277, which carries five passengers and two pilots is powered

This Dornier seaplane has made 6712 flights in seven seasons.

with a 300 H. P. motor. During the entire seven-year period it has not required, besides the usual minor overhauling work, any larger repairs, which surely is a very good testimony both for the flying machine and the pilot.

And today, after seven years' service, the D277, in perfectly good condition, is waiting for the reopening of flying operations.

France Aids the Private Flyer

TWENTY million francs ($784,000) for encouragement of touring aviation in France were voted recently by the Chamber of Deputies for the year beginning April 1, 1931.

The amount voted is twice the ten million asked for, which it had been suggested should be used as follows:

Subsidies for individuals for the purchase of planes or for learning to fly, $207,760; for the upkeep and improvement of landing fields for private flying, $117,600; gliding, $7,840; service connected with private flying licenses, $14,112.

To encourage recruiting of mechanics for flying clubs, $5,644; purchase and upkeep of four planes for officials of the Ministry of Air to be used in the development of private flying, $19,600; aviation schools, $11,603.20; to organize a competition for touring airplanes, $7,840.

Gliding in South America

THE first Argentine glider club, formed in December, 1930, has begun a regular course of instruction, which is given by three airplane pilots and three amateur glider pilots. Operations are carried on at the airport at Moron in the Province of Buenos Aires. The club which has 28 active members uses an American built glider.

Inventor Demonstrates Dirigible Mooring Mast

DR. ALFRED WILKES, Los Angeles, inventor, recently made the first public demonstration of his newly-devised dirigible mooring mast. The ship, nose into the wind, is made fast at the prow, while the automatic rear mast is kept out of the way.

When the nose is fast, the rear mast automatically takes up its position at the tail, which is then moored. Thereafter, the ship's alignment with the wind is automatic.

War Pilot Meets His Rescuer After Twelve Years

A REMARKABLE coincidence came to light recently during one of the Ground School lectures on "Bombardment Aviation," at Rockwell Field, Coronada, Calif.

Mr. J. R. Pearson, Jr., a wartime member of the 11th Aero Squadron*, favored the officers of the group with a short talk of his wartime experiences. Mr. Pearson told in detail of the last bombing raid in which he participated and during which he was shot down.

On this last mission, October 4, 1918, Lieut. Pearson was assigned the task of closing the vee of the formation in a French Breguet bomber. The formation took off and headed for enemy territory, climbing steadily. Shortly before reaching its objective, and at an altitude of 14,000 feet the patrol was attacked by thirty Pfalz scouts. The bombers pushed on to the completion of their mission, dropped their bombs, and headed for home.

A bullet from one of the Pfalz scouts hit Lieut. Pearson's engine and severed the water line. Shortly thereafter his motor froze, forcing him to drop behind his formation and take care of himself. Almost immediately, four of the enemy ships concentrated their efforts on Lieut. Pearson's Breguet, and things commenced to look mighty bad. Private Newby, Lieut. Pearson's gunner, rattled away with his guns, doing his best to relieve the situation. Suddenly the guns in the rear seat were silent—Private Newby had stopped some of the Boche bullets!

Lieut. Pearson was busily engaged in directing the Breguet to earth, when, without warning, his flipper controls were shot away. The situation at this time had an ominous outlook. A short lull, and then—the certainty which Lieut. Pearson knew could not be avoided, occurred — an enemy bullet found its mark in his left leg. Just as surely as he knew he would be shot, he also knew he had nothing more to fear, that as far as he was concerned the enemy bullets would no longer find his body as a target.

His deductions were accurate, for at this point a lone Spad came screaming down in a power dive, intent upon aiding his sorely pressed comrade. One of the enemy scouts fell before the withering fire of the Spad's guns. The pilot of the Spad zoomed, regained his altitude, and again he roared in on the Breguet's adversaries with his guns chattering. A second Pfalz was obliterated from the picture under the deadly aim of the Spad pilot. Without further ado, the two remaining attackers turned for home as fast as their ships could take them.

(*Continued on page* 61)

* *One of the day-bombing squadrons mentioned on page* 6.

The Round Robin Club

A correspondence plan for POPULAR AVIATION readers.

HOW would some of you P. A. fans like to swap aviation ideas with a lot of other readers every month? We know that many of you will jump at the chance, so this month we are starting a new development of an old idea—the Round Robin letter.

It all started back several months ago when POPULAR AVIATION published the photograph and address of Donald Boggs who was sick in bed and wanted to correspond with some P. A. readers. (April issue.) So many letters came in to Don that his doctors wouldn't let him answer all of them.

After vainly trying to keep up his end of the correspondence, he finally decided to answer all his correspondence at once. And so he wrote one long letter and sent it on to one of his P. A. friends with the request that it be forwarded to the next correspondent on the list, together with a letter from the first man.

Each correspondent in turn added a letter of his own to the group, and when Don finally got his own letter back again, there were ten other letters along with it from his ten regular correspondents. Then all he had to do to answer all of these ten letters was to write one of his own, and send it along in the place of his previous one, which he kept.

That very briefly and simply is the beginning and the mode of operation of the Round Robin.

Don wrote us about this scheme, and we were privileged to see the first copy of the robin while on its rounds. The idea appealed to us so much that we believe that there are hundreds of readers who would be glad of the opportunity to get acquainted with others of their own age with whom they can swap aviation ideas and experiences. So we are making this offer to any who would like to join and form Round Robin groups.

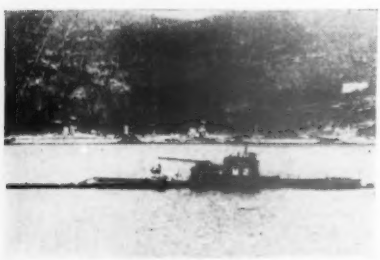
If you will send your name, address, and age to POPULAR AVIATION, we will arrange groups of ten and start additional Round Robins.

Round Robin No. 1 includes beside Don Boggs, Howard Peck of Chicago, Howard Coker of Milwaukee, Victor Sargent of Arlington, Mass., Philbert L. Ainsworth of Bolton Landing, N. Y., J. Bianca of Brooklyn, N. Y., W. B. Michael of Caldwell, Ohio, Bill Metzger of Lakewood, Ohio, Omar Dennis of Granite, Okla., and Wallace McNeil of Clay Center, Kans.

The subjects this group discuss range all the way from the latest model up to whether or not monoplanes make satisfactory pursuit jobs, and the fellows are certainly getting some valuable pointers from these letters.

So if you want to get in on a good thing, too, just send your name in to POPULAR AVIATION and in a couple of weeks you will be in on a Round Robin of your own. Watch for news of the Round Robin clubs in next month's P. A. It will be a regular feature from now on.

A Submarine Aircraft Carrier



ONE of the first photographs ever made of the British submarine aircraft carrier, H.M.S.-M-2, pictured in the harbor at Gibraltar when the plane was about to leave the runway on the submarine's deck. The M-2 is one of the most important features of the portion of fleet now at Gibraltar.

Planes Aid the Doctor

A CONVINCING demonstration of how the airplane can be used to enlarge the district served by the doctor was given recently when two doctors flew 150 miles one morning from Brisbane to Adelaide, Australia, to complete an operation and returned home in time for breakfast.

Patent Exposition Planned

SEPTEMBER 14th to 27th are the dates that have been set for the Second International Patent Exposition in Chicago. At this time inventors may display their latest devices to the many manufacturers who are expected to attend the exposition.

Navy Pilots Rated for Altitude Work

EVERY pilot in the United States Navy has been classified according to the altitude to which he can safely fly, through accurate tests made on the ground.

It is called the "rebreather" test. When a flier takes the test he is stripped to the waist, electrical contacts fastened to his ankles and wrists to record his heart action, a clothespin put over his nose, and a tube in his mouth. He breathes through this tube, taking his breath out of a tank full of air.

Before the pilot are two rows of small light bulbs, set in a table. At one side is an ammeter, similar to those on the dashboards of automobiles. Under the table is a siren, and the flier's right foot rests on a pedal which controls the loudness of the siren.

While the test is under way these lights keep flashing, the ammeter needle swings, and the siren keeps changing its tune. The man taking the test has to touch the button under each light when it flashes, turn a knob to keep the ammeter needle in the center, and work the pedal to keep the siren's drone at the same tone.

He usually does it without trouble for the first 15 or 20 minutes, some even longer. Then he begins to feel the effect of the smaller supply of oxygen in the tank, begins making mistakes and finally slumps in his chair. The doctors always pull the tube from his mouth and give him smelling salts before he has completely lost his senses.

By timing the flier and measuring the diminishing supply of oxygen, the flier's height ability can be determined. A few Navy aviators can go no higher than 8,000 feet without artificial oxygen, but others can go as high as 30,000 feet.

New Devices Make Blind Landings Possible

THE hazard of a blind landing, the last great obstacle to flying under all weather conditions, has been overcome if the new radio beacon equipment announced by U. S. Bureau of Standards experimenters, H. Diamond and F. W. Dunmore, lives up to predictions.

For upwards of two years past, directional radio beacons have guided pilots from point to point in flying, but when the plane arrived above its destination in fog, the precise three dimensional relative position of plane and runway was still unknown.

In fact, the pilot was lost at the very end of the trip and had either to return to his starting point, fly around waiting for the fog to shift, or take the last desperate resort of a really blind landing.

The logical and essential development was to provide a field localizer that would guide the aviator to the runway itself. Various partially successful systems have been evolved to do this. How the new device works may best be seen if we follow a plane through a blind landing.

Bearing in to the fog hidden airport is a mail plane flying blind. Through his phones or instruments the pilot is getting the main beacon's signals that have guided him for perhaps 150 miles directly toward his destination.

Suddenly the vibrations of the reeds on his course indicator drop to zero, for he is directly above the beacon tower in a zero signal area. He then tunes his receiving set to a new frequency, and begins to get the signals from the "runway localizing beacon" which is at one end of the runway. He

(*Continued on page* 56)

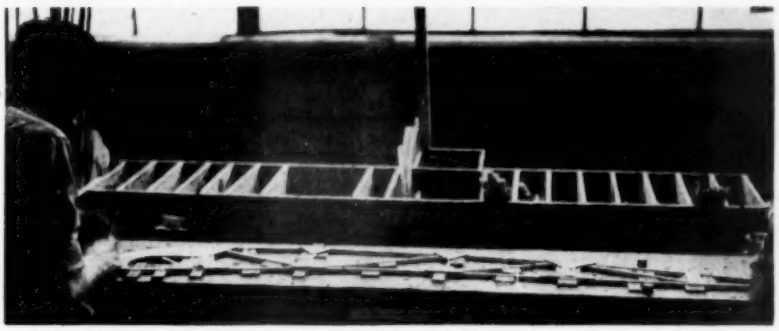
XUM

A Tour Through an Airplane Factory

Jim wanted to see the inside of an airplane factory. So Bill, the production manager, took him through, and showed him exactly how a modern airplane is made.

by

U. C. McMILLER*



In the rib department. A worker building ribs with the use of a template.

A PLEASANT "Good-morning, Bill," interrupted me as I was going through the mail.

Looking up, I found my old friend, Jim Morrisy, helping himself to my cigarettes and a chair.

"Well, Jim, how's things this morning?" I asked as I extracted a smoke for myself and leaned back in my chair.

"Pretty good," he said. "Spent most of yesterday afternoon out at the field, listening to your salesman use up all the superlatives in the dictionary. He sure did his durndest to convince me that this low-wing job you're building here is the 'one and only'."

"And you agree with him, of course, and have come in this morning to place your order. Just a minute till I get my pad of order-blanks out, and we'll—"

"Oh Yeah! Well, don't get in any hurry," interrupted Jim, while I registered mock surprise. "You know the old saying about believe nothing you hear and only half of what you see. Well, I refuse to believe anything he told me, and only half of what I saw while he was demonstrating. What I want now, is to see for myself how these new production jobs are built,—particularly how those wings of yours can stick right out in the air without any bracing."

"Skeptical of internally braced wings, are you Jim?"

"Yes and no. After being an unwilling passenger during the couple of seconds that it took to pull her out of a power dive, I wouldn't question anything. On the other hand, I want to see for myself."

"Well, it's all very simple, Jim. When one knows the moments about the neutral axis and the—"

"Now, now, sign off on that lingo. What I know about axes is limited to my studies of geography in the fifth grade. You'll have to take me through the factory and give me the works in everyday language. All I ever knew about airplanes was how to fly 'em."

"O.K., Jim," I said, getting up from my chair. "Let's go out to the stockroom first."

"Furthermore," continued Jim as we walked across the shop, "if you can sell me this low-wing idea, I'll buy a ship from you this morning and take you out to lunch to boot."

"Fine, and don't forget the eats," was my prompt reply.

"You would say that, wouldn't you?" retorted Jim. "You haven't changed a bit since cadet days at Kelly. I suppose you're more interested in the lunch than you are in getting my signature on the dotted line?"

"Why certainly," I replied. "The signature on the dotted line will be a mere matter of routine when I get through with you."

"Oh it will, will it?" was Jim's comeback as I opened the stockroom door and motioned him to enter. "Don't get too sure of yourself. You may be the best airplane builder in the world to some people, but you're just another rum-hound to me."

"Shut up," I growled. "Some one will hear you. Now get into these cover-alls, and then we'll try to get some of the elementary details of airplane construction into your head."

"All right," he answered. "I'm all attention."

WE stepped out of the stockroom into the central aisle.

"Now, Jim," I began, "I want you to get a picture of the whole and then we'll get the details. This center aisle, is the Assembly Line. On this side, is the Woodworking Department, then the Covering and Upholstering down there, followed by the Dope Room and Spray Room.

"Over on the other side, we have first the Welding Department, then the Machine Shop, and last the Sheet Metal Department. Sandwiched in between each Department is an area reserved for experimental work.

"Now, let's start here in the Woodworking Department.

"First we come to the storage racks. Here we keep our lumber and plywood. Most of our spruce comes from the mills all ready cut to the correct cross-sectional area, just as you see it here.

"Isn't that beautiful stuff?" I asked as I picked up the end of a spar flange. "Just look at it. Close grained, straight, no pitch marks or pockets. In short, it is perfect lumber. Every bit of it must conform to government specifications."

"What's that about the government?" asked Jim.

"Everything that has to do with an

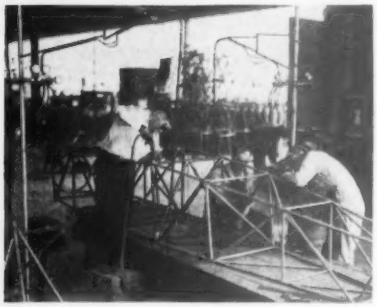
The wing department. In the foreground, two workers are covering the finished wing structure.

* Former pilot, Royal Flying Corps and U. S. Marine Corps; airplane and glider designer; former Production Manager, Mohawk Aircraft Corp.

airplane is under strict government supervision," I explained. "The Department of Commerce has been given supervisory authority over things aeronautical to a degree that is unparalleled in any other industry. Uncle Sam's sure on the job when it comes to making airplanes safe. The Approved Type Certificate is a guarantee to every purchaser that the airplane so certified is one hundred per cent O.K.

"While we're here," I went on, "I want you to notice this plywood. We use birch and mahogany in three and five ply of various thicknesses. This is known as the blood-albumen process plywood. That is a term that applies to the way the layers of wood are glued together. I might also add that it is the best and most expensive kind made. We use nothing else.

"Now to get into the actual work.



The second fuselage station where the fuselage is completed.

Over here, Jim, is the rib building, then the spar building. Alongside of those two activities is the wing assembly, and at the other end of the department is the miscellaneous wing work and the miscellaneous parts. We'll look at each division in the order named.

"This is what is called the cut-out type of rib," I explained as I led Jim over to the rib-workers' benches. "There is a steel pattern or template cut for each rib,—this being necessary, of course, because in a tapered wing, each rib is of a different size.

"These templates are traced on sheets of plywood and then by nailing a half a dozen sheets or so together and feeding through a band saw, we saw out a bunch of duplicates of each template. Large holes are then drilled through the webbing as the duplicates are now called, in order to reduce weight. After this, the nails are pulled out and the webs are ready for rib assembly.

"The first job is putting on the capstrips. Spruce strips are soaked in hot water for several hours and then they are glued and nailed along the outside edges of the webs. After the capstrips are on, stiffeners are put in between, also glued to the webbing. After the rib is dry, it is finished off on a disc sander."

"What are those two large holes for?" asked Jim.

"For the spars to slide through," I answered. "I forgot to mention that. When the lightening holes are drilled, these large rectangular holes are also cut out. We use a jig saw for that operation."

"WHAT kind of glue is this?" was Jim's next question.

"Casein," I replied. It is a by-product of milk and comes in powdered form. All that is necessary is to mix it with water at room temperature and it makes the finest glue you ever saw.

"To get best results, it is necessary to weigh the glue and water and also check the mixing time against the clock. Any slight variations reduce the strength. Also it is not good after a batch is four or five hours old. A fresh batch should be mixed at the end of that time. If one were making furniture, it wouldn't make much difference, but for aircraft work, it is important."

"Yes, I suppose glue is what holds most of a wing together," offered Jim.

"You said it," was my prompt rejoinder. "The nails that you see used in making those ribs are primarily for the purpose of retaining the pressure of the final blow of the hammer. Pressure is essential if the glue is going to do its work. On spar work, which we will look at now, we use clamps in addition to the nails. Let's go over here to the spar jigs."

"Jigs!—what are they, may I ask?"

"A jig," I explained, 'is a device made of wood or steel which insures exact duplication of parts made or worked on in it. We use two spar jigs, as the dimensions of the front and rear spar are different. Front spars are invariably deeper and thicker than rear spars.

"This is what is known as the box type of spar, tapered. The four main parts of it are the spruce flanges, which form the top and the bottom of the box and then the sides which are of plywood webbing. I want you to notice the plywood, Jim. It is quite different from the sheets we were looking at on the racks. This stuff here is two ply and comes in long narrow strips instead of sheets. Also the grain, runs at forty-five degrees instead of cross-

A bandsaw cutting steel tubing.

wise and lengthwise, it is made especially for spar construction.

"At the root or thick end of the spar we use several layers of this plywood. That is because the strain on the spar increases rapidly at this point. We also fill in between the flanges with spruce at this point until the spar is almost solid here. That is partly because of the strain already mentioned and partly because of the large amount of wood that will be drilled out of the flanges for bolting on the wing fittings."

"What are these little up-and-down pieces between the flanges for?" asked Jim.

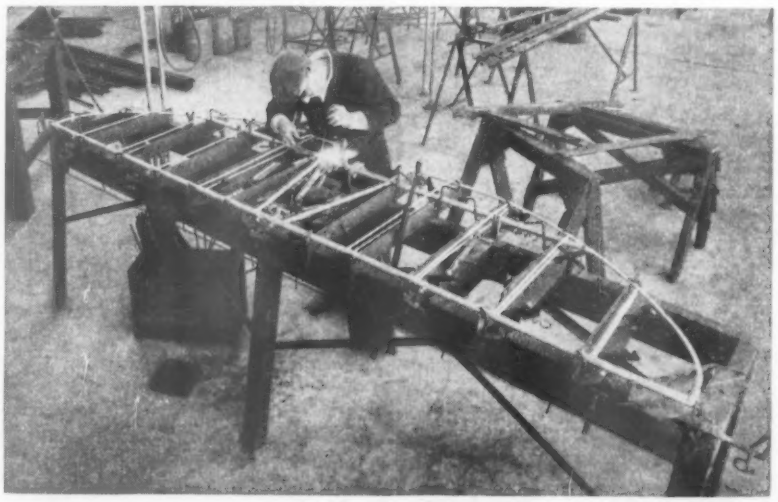
"Those are what we call bulkheads," I answered. Wherever a rib crosses the spar we put one in. They stiffen the plywood and at the same time provide material to which the glue-blocks can be nailed. Glue-blocks fasten the ribs to the spars."

"I see," said Jim. "Glue-blocks are cut from that triangular stock that I saw over in the rack, are they?"

"Correct. Now let's take a look at the wing assembly.

(*Continued on page* 58)

Welding the horizontal stabilizer over a metal jig.



These Planes Flew in Army Demonstration

THE recent Army air maneuvers carried out over a wide section of the country have been so well described by the press that we can do little more at this late date than to mention the extraordinary precision of the schedule and the gratifying absence of any casualties.

It may be of interest, however, to inquire into the types of planes that made this unique record possible. A recent bulletin of the Army Air Corps lists the following 667 planes as having constituted the First Provisional Air Division which made the flight:

Pursuit—205

58—P-1 Curtiss "Hawks," 425 h.p. water-cooled engine, V-type.

130—P-12 Boeing, 420 h.p. "Wasp" engine.

17—P-6 Curtiss, 600 h.p. liquid-cooled V-type engine.

Observation—300

36—BT Douglas Basic Training, 420 h.p. "Wasp" air-cooled engine.

51—02-H Douglas Observation, 420 h.p. Liberty engine.

82—0-38 Douglas Observation, 525 h.p. "Hornet" air-cooled engine.

10—0-25 Douglas Observation, 600 h.p. liquid-cooled V-type engine.

1—0-31 Douglas gull-wing monoplane, 600 h.p. liquid-cooled V-type engine.

55—0-19 Thomas-Morse, metal fuselage, 420 h.p. "Wasp" air-cooled engine.

39—0-1 Curtiss "Falcon" 425 h.p. water-cooled engine.

24—0-11 Curtiss "Falcon" 420 h.p. Liberty engine.

1—0-21 Same as 0-19, except that it has a 600 h.p. Curtiss Hex engine.

1—0-22 New Douglas Observation, all metal fuselage.

Attack—70

70—A-3B Curtiss "Falcon" 425 h.p. water-cooled engine.

Bombardment—44

4—LB Keystone, double rudder, two 525 h.p. "Hornet" air-cooled engines.

31—B-3A Keystone, single rudder, two 525 h.p. "Hornet" air-cooled engines.

9—B-2, Curtiss "Condor" two 600 h.p. liquid-cooled engines.

Cargo—48

5—C-1, Douglas, single "Liberty" engine.

5—C-4, Ford Tri-motor, "Wasp" engines (monoplane).

4—C-6, Sikorsky, dual-engine amphibian (monoplane).

9—C-7, Fokker tri-motor "J-6" engines (monoplane).

6—C-9, Ford tri-motor "J-6" engines (monoplane).

13—C-14, Fokker single "Cyclone" engine (monoplane).

1—C-15, Fokker "Hospital" plane, single "Cyclone" engine (monoplane).

2—C-19, Northrup all-metal, low-wing monoplane "Wasp" engine (monoplane).

3—C-22, Fleetster, single "Cyclone" engine (monoplane).

Henry Hunt and His Planes

by J. E. BULLARD

The Hunt Crusader designed in accordance with Mr. Hunt's original ideas. The plane incorporates a number of unusual features and is said to have landed repeatedly at speeds of about 22 miles an hour.

IN HIS search for the solution of the problem of designing and building a fool proof plane that can be sold at a low price, Henry Hunt, president of the Hunt Aircraft Mfg. Co. has designed and tested what he believes is the world's slowest landing airplane. His present accomplishments are the result of a life time given to aviation.

It was when he was a small boy living near Norfolk, Va., that the Wright brothers were conducting their experiments at Kitty Hawk. Though Kill Devil Hill was not an easy place to reach from his home at that time, he, together with a number of other boys made it a practice to go there as often as possible, to get as near the machines as they were allowed and to watch the flights. The days he patiently waited to see a glider or a powered plane remain in the air a few seconds or minutes instilled in him the desire to devote his life to aviation.

When in 1910 he heard that a company had been organized in Girard, Kan. to built airplanes and that it needed labor to complete a plane that was already under construction, he simply had to make the trip to Kansas. Without funds himself and knowing it useless to obtain permission from his parents to make the trip, he took leave from home without permission and stealing rides on freight trains eventually arrived one fall morning in 1910 at Girard. He immediately proceeded to the plant of the Aerial Navigation Co. of America, where they put him to work in the afternoon.

The plane on which he first worked and which was nearing completion when he arrived was a strange appearing aircraft. It had four engines for air propulsion with both tractor and pusher propellors and a fifth engine for propulsion on the ground. Aluminum tubing was used in the frame and there were a number of wings.

The dedication of this plane was made an important affair and those who planned to take the first flight proposed to fly directly to New York and if all went well that far to continue on across the Atlantic to Europe. The plane, however, never left the ground and was demolished when it ran into a gulley on the first attempt.

After the crash of the first plane Henry Laurens Call, president of the Aerial Navigation Co. called his working force together at a meeting in his office, showed a photograph of the Bleriot plane that had flown across the English channel and asked what those present thought about building a plane like that. Everyone thought that between them they could design and build such a ship and work was started.

Mr. Call made the sketches and others worked on the design, all suggesting some idea that could be incorporated. This plane when completed had many of the features used on planes today. There was a tail skid, two landing wheels, shock absorbers and the engine was installed in the nose of the fuselage. This Call monoplane was one of the very first planes of this type to be built in this country.

To fly the plane satisfactorily it was necessary to secure the right engine and as there appeared to be no such engine on the market, the force got together and designed and built a double opposed forty horse power water cooled engine which was used on the plane. This ship flew well for an airplane of those days and had been in the air many hours before a Kansas cyclone came along and detoured just enough to pick up the plane where it was tied to the ground and completely demolish it.

This catastrophe promising to prove a serious blow to the company, Mr. Hunt moved on to Dayton, Ohio, where in 1913, he passed the tests for airplane pilot. He then went to Norfolk, Va., where he built a Bleriot type monoplane but installed a much larger engine than was the practice in those days. This engine was an Emerson water cooled six cylinder, two cycle power plant of 120 horse power and he was assured before he made any test flights it was committing suicide to try to fly it. The ship was the same size as the smaller powered Bleriot monoplane but had been built stronger to take care of the increased power that was used. He flew it for a time

(*Continued on page* 53)

Wind Tunnel Principles Used in Roof Landing Platform

This Month's Cover Design.

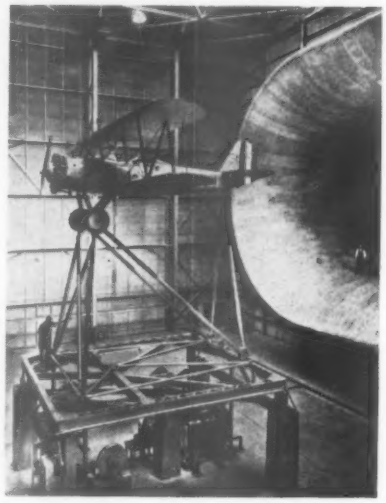
A GARAGE and landing field for aircraft on top of tall office buildings has been patented by John Schimmel of Philadelphia. Incoming pilots would direct their planes into a wind tunnel only twice as wide and twice as high as the machine itself.

On either side of the tunnel fans set in motion by a signalman would force air out at the exact speed of the landing plane. When the plane comes to a stop, the propellers and the fans would be cut off at the same instant.

An elevator would then remove the plane to the garage on the floor below. In order to meet various conditions of wind direction, the tunnel would be movable.

Not long ago, this design might have been considered too fantastic for consideration. However, with the completion of the new gigantic wind tunnel at Langley Field, Va., the landing tunnel becomes only a short step forward.

The Langley Field tunnel shown here has a throat 60x30 feet permitting the testing of full size airplanes in an air stream at velocities up to 115 m.p.h.



The roof landing tunnel described in this article comes within the realm of possibility in view of the tremendous size of the government's new wind tunnel at Langley field shown here. The man standing at the mouth of the tunnel gives an indication of its size. A small plane could fit into the Langley tunnel with room to spare.

A Freak Accident

A PACIFIC coast millionaire was killed recently in one of the strangest accidents in aviation history. It seems that this rich flyer was transporting a lamb in his plane and the animal jammed its nose into the hole through which the control stick protrudes. The plane was thrown into a spin from which the pilot could not recover.

Aeronca Runs Wild With Experienced Pilot

THREE planes were smashed recently while a large crowd at Roosevelt Field watched a peculiar accident in which the only pilot involved, George Dade, 19-year-old high school boy, escaped with bruises.

"Dade, a senior at Hempstead High School, was guiding his small Aeronca plane down a concrete runway into a strong wind, taking off. It has a 30-foot wing spread and a forty-horsepower engine, and his friends call it 'the flying bathtub.'

"The throttle of 'the flying bathtub' jammed, Dade lost control and the small machine did a ground loop and shot into a line of sixteen planes parked near the takeoff runway. The Aeronca was a complete loss, a Ryan monoplane lost its tail and rudder, and the fuselage of an Aristocrat cabin monoplane was smashed in the accident. Total damage was about $2,500.

"Dade was shaken up and suffered slight cuts and bruises, but did not require medical attention. He is a licensed pilot."

—*Chicago Herald and Examiner.*

Japanese Woman Becomes Parachute Jumper

AND now Japan, in her race with western civilization, has developed her first woman parachute jumper. She is Miss Miyoko Miyamori, who at 19 is the first of her sex to jump from a plane in Japan.

She intends to make parachute jumping her profession and hopes some day to become president of a parachute manufacturing firm.

Plane Size Chutes Are Practical

ACCORDING to Army Air Corps experts, huge parachutes for lowering passenger and freight airplanes will soon be practical. A giant parachute, 84 feet in diameter and 5,539 square feet in area, having ten times the supporting capacity of parachutes used by fliers, has been tested and is successful.

However, unless some device is found for separating the machine and the parachute as soon as they reach the ground, there is a danger that the plane will be dragged along and upset, if not wrecked. A "chute" that deflates itself on reaching the ground has not proved successful as yet.

The ordinary parachute used by aviators is 23 feet in diameter and 453 square feet in area. As a square foot of parachute area has been found to support one pound in air, the fliers' chutes will support 450 pounds, which is sufficient for the heaviest aviators. Going on the above fact, it was found that the giant parachute would support more than 5,000 pounds, which is more than most planes weigh.

Army fliers have not contented themselves merely with study and experimentation of plane parachutes. They have also tried out various types and shapes of parachutes. One of these is a square parachute which, it is thought, may be more advantageous than the round one now in use.

The need of the whole air industry for some means of getting crippled air-ships safely to earth with their passengers will likely lead the Army Air Corps, through the Bureau of Aeronautics, to place its findings before the aviation industrial world as soon as the problem of detaching the planes from the giant parachutes is solved.

Tales Around the Hangar

by KELLEY McLEAN

WHILE waiting for the fog to lift the pilots on the field often gather in the corner of the operations building to exchange experiences. These stories are often very interesting and we are presenting some of them for our readers.

It seems that a flying circus was touring the state of Texas and at this particular time was operating from a very small field which was surrounded on three sides by trees and on the fourth side by a four foot fence and what was much worse a twenty-foot telephone line system.

This field was very unsuitable but was being used because of its proximity to the city. The pilots were obliged to bring the planes in for a landing at a very low altitude and were also having to climb very steeply when taking off.

One of the pilots who was flying an OX-5 powered biplane, was coming in for a landing when his motor cut out, while some hundred yards from the field. The pilot seeing that he did not have sufficient altitude to clear the telephone wires did the unusual by diving the ship for speed and flying the ship between the telephone wires and the wires on the fence!

Not a single wire was touched and upon measurement the clearance between the top wire on the fence and the lower wire on the telephone poles was found to be only two feet more than the height of the plane. Whether the pilot is to be credited with this feat or whether it was plain luck will never be known.

* * *

Two pilots were arguing concerning the load carrying capacities of their respective ships. One of these pilots was flying a Hisso Standard, while the other was flying a six passenger cabin monoplane.

The two decided to make a wager

(*Continued on page* 54)

An Encounter with Savages

Forced down on a crocodile-infested jungle river, these intrepid flyers were faced by a howling mob of head hunters.

by
MILTON E. STOLLBERG

WE HEAR little of the adventures of those intrepid pilots who are flying their hazardous runs in the remote places of the earth—the new and the last frontiers of civilization. Their daily flights are replete with thrilling adventures in which their skill and bravery must be pitted against sudden and unforeseen dangers—tropical hurricanes, savage natives, forced landings in impenetrable jungles, and a hundred and one other risky situations that may arise.

It was my pleasure recently to be a member of a party which flew a large Hamilton seaplane to South America, for service with the Andian National Corporation. These seaplanes, although they operate inland, are used in preference to landplanes because of the lack of suitable landing fields along the route flown, which extends from Barrenquilla to Cartegena and roughly follows the tortuous course of the Magdalena river through Columbia.

John Miller, chief pilot for the Andian company, was one of my companions on a flight over this route. He told me that it takes about five hours to fly from Barrenquilla to Cartegena, and that by river boat the same trip takes from two to six weeks, depending on the season.

The Magdalena is a typical jungle river. Winding its turbulent way through rocky gorges, it tumbles through the densest jungles imaginable. With only a small occasional beach, it barely offers a suitable landing place in case of plane trouble.

Arriving at Cartegena, I was rather surprised at the progress already made in this out of the way place. Smooth ramps extended from the water's edge to the apron in front of the hangers. Moored alongside our ship were some seaplanes of German manufacture, which are operated by the Scadta Company, a German organization.

I met a number of the foreign pilots, who were very agreeable fellows. A few of them had been engaged in sky-fighting for Der Vaterland in the late fracas. This fact led to some good-natured raillery, and before long we were in an animated discussion. The talk soon turned to the respective merits of German and American planes and, of course, it was inevitable that someone propose a race between our Hamilton and one of the German planes.

It was decided to hold the race over a triangular course. Miller, being familiar with the surrounding topography, was to handle the big Hamilton and Captain Von Buelow, a tall, thin chap with a reddish moustache and a close haircut, was to be at the controls of the German plane.

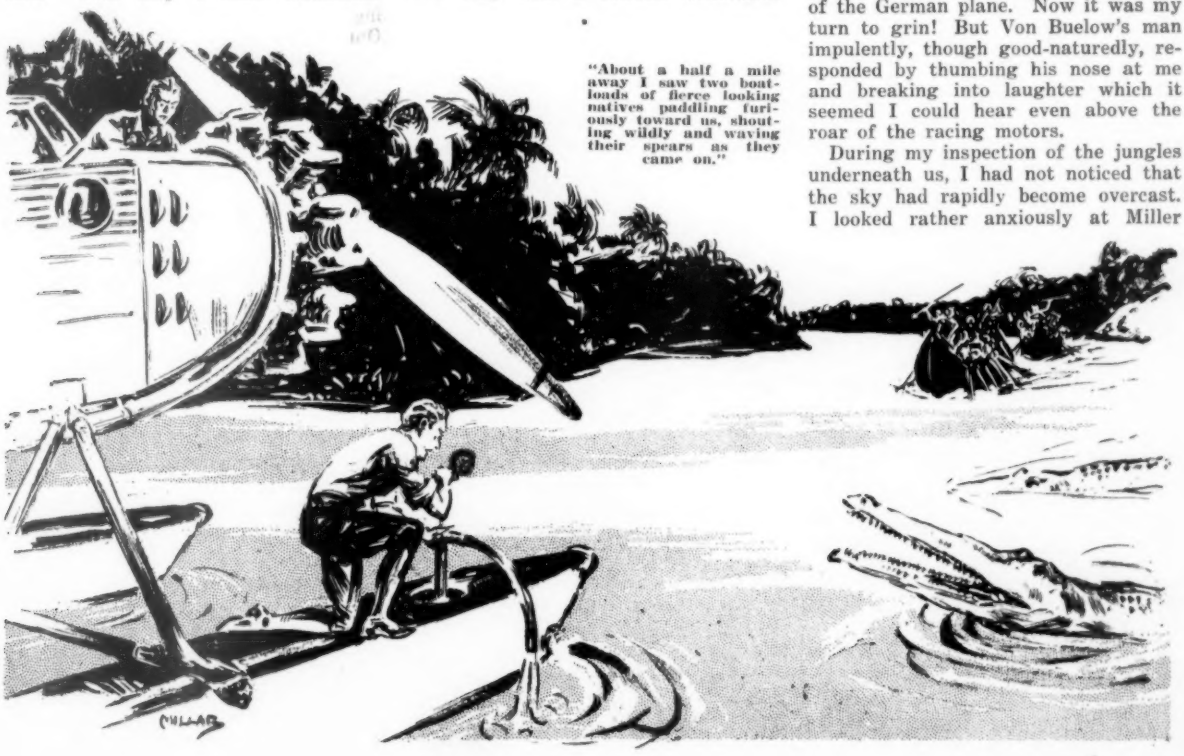
At the hour appointed for the race, there was a good crowd at hand. Practically every member of the Scadta and Andian companies had laid at least a small wager on his own man, so naturally there was considerable excitement when the two planes slowly taxied into position, their motors turning over smoothly and in prime condition for the contest.

I was with Miller, and Von Buelow had his mechanic along. At the signal, both pilots opened their throttles and the two planes gathered speed over the waters of Barrenquilla Bay. In about twelve seconds the Hamilton took to the air and Von Buelow followed a moment later, his plane darting forward to gain an even advantage with us. I looked across to the big German ship. Von Buelow was concentrating intently on the view in front of him, but his mechanic gave me a grin as they pulled slightly ahead.

BOTH planes were capable of about the same speed, although for a few miles our rivals seemed to have the better of us. I spoke to Miller and he nodded reassuringly to me, so I figured that he had something up his sleeve to surprise Von Buelow with.

Just as we rounded the first pylon, Miller gave the engine full power and she responded admirably, leaping forward until we drew once more abreast of the German plane. Now it was my turn to grin! But Von Buelow's man impulently, though good-naturedly, responded by thumbing his nose at me and breaking into laughter which it seemed I could hear even above the roar of the racing motors.

During my inspection of the jungles underneath us, I had not noticed that the sky had rapidly become overcast. I looked rather anxiously at Miller



"About a half a mile away I saw two boatloads of fierce looking natives paddling furiously toward us, shouting wildly and waving their spears as they came on."

and he sensed the question in my mind. Shouting above the droning motor, he said, "It's only a slight tropical shower."

Having heard a great deal about these sudden squalls that come up in the tropics, I was somewhat apprehensive and mentally I pondered what Miller had meant by "slight tropical shower." I was soon to find out!

About ten miles from the second pylon the storm broke in all its fury. A few moments before we had seen Von Buelow running almost neck and neck with us off to our left, but now we could scarcely see a foot in either direction. The rain splashed against our cabin windows and the terrific wind buffeted us from side to side. Occasionally the plane seemed to come to a standstill as a particularly strong headwind impeded our progress.

In a few minutes there was a noticeable cessation of the tempest. The ship rode more evenly and presently we were once more able to see beyond the immediate vicinity. We looked anxiously for Von Buelow, but the plucky German was nowhere to be seen. Immediately we forgot all about the race and began describing circles, all the while scanning the jungle below for a sight of the captain's ship, which we feared had crashed in the storm.

Our efforts were fruitless, though, so we nosed the Hamilton towards Barrenquilla, which lay only a few miles to the north.

As we alighted once more on Barrenquilla Bay we could see that the crowd was restless. Our hope that Von Buelow had reached Barrenquilla ahead of us went glimmering when we noticed that his ship was nowhere about. As our plane came to a stop we emerged from the cabin and were greeted excitedly by the crowd.

No, we hadn't seen Von Buelow after the storm! With this admission from us, everybody seemed to sense the seriousness of the situation. With calm determination, though, Miller and the other pilots prepared to organize a searching party. Several ships were gassed up, and we were just about to take off on another flight over the jungle when someone shouted, "There he is!"

Sure enough! Flying low in the distance we could see the German plane, headed for the bay. Presently she slid gracefully to the surface of the water and taxied up to the ramp. Von Buelow, with a sheepish smile on his face, climbed out of the cockpit and his mechanic followed. They were unaware of the anxiety their late arrival had caused.

Unable to see because of the terrific rain and wind, Von Buelow had lost his way and veered far from the race course. After the storm cleared, he had experienced some slight difficulty with his engine. Finding himself over a fairly calm portion of the Magdalena river, he had alighted in order to make repairs.

With this explanation, everybody was once more happy. All bets were called off, but Miller and I, as well as the Andian outfit in general, were secretly proud of the performance of our plane.

THRILLING as our racing venture had turned out to be, our most harrowing experience was still ahead of us. It occurred the following day, during our flight to Cartagena, the other end of the Andian company's airline.

After a restful night, we were up early in anticipation of the air journey before us. The route we were to fly followed the Magdalena river for about 550 miles, through a country that was largely jungle and in which several tribes of savages were known to exist.

Look up the Magdalena on your map of South America. Note the many twists and turns the river makes and you will have an idea of the difficul-

A Hamilton sea-plane similar to the one that Miller piloted.

ties confronting a flier who takes it as his course. However, the air route over the river requires only a few hours, while navigation by boat is a matter of weeks.

There is always a group of natives around to watch the take-offs and landings of the planes. Attired in primitive dress, they present a curious contrast to the latest development of our civilization. Most of the native hangers-on at the airport were employed in Barrenquilla as laborers and were quite civilized.

However, we heard fantastic stories about their brothers in the interior, many of whom were known as head-hunters and were very unfriendly to visiting whites. When the airlines first opened these savages had been frightened at the sight of the planes winging overhead, but their superstitions and fears were allayed after a time and they had recently been known to attack pilots who were unfortunate enough to make forced landings. Nothing serious had resulted from this source as yet, however.

Our ship had been gassed and checked and at about nine o'clock in the morning we climbed into the cabin. There were four of us aboard—Miller, who was the pilot, Murchison and Hollender, officials of the company, and myself.

After taking off, Miller throttled down to about 100 miles per hour with a slight head wind to buck against. Far below us we saw a river boat plodding its way with great effort through the waters of the Magdalena, which we could see were infested with crocodiles. Not so pleasing to be forced down here, I thought. At best it would be several days before we could find our way back to civilization, always providing, of course, that we were able to avoid the unfriendly natives, battle swarms of insects, and beat our way through the thick undergrowth.

For miles we proceeded, and after a couple of hours the droning of the engine became monotonous. However, everything appeared to be going well and I had just reconciled myself to the eventual success of the trip when something happened.

Suddenly the engine sputtered. In a second or two it seemed to be operating smoothly again, then once more it sputtered and died altogether!

We were at three thousand feet. Miller put the ship in a long, flat glide, apparently heading for the large bulge in the river. Down, down we went. I anxiously scanned the surface of the river to see if there was a landing space available. At about 500 feet I noticed several large crocodiles scurrying hurriedly into the water. Apparently the ship had frightened them from their sun baths on the beach.

Miller was "fish-tailing" the ship in to break the landing speed as much as possible. Twenty feet off the water I held my breath, expecting that we might smack into one of the crocodiles or a log. There was nothing in our immediate path, however, and a moment later we were down with a squash!

The instant after we touched the water, fate in the form of a man-eating crocodile crossed our path. Crunch! Our right float hit him and we came to a standstill in the middle of the stream. A pretty mess of fish, or rather crocodiles, we were in!

Miller grinned!

"You would," I said to him. "If we don't get that damn float fixed we'll have to play sit and wait, with a flock of crocodiles for opponents. Lots of fun!"

"Well, you won't starve to death anyway," Miller said, "Here's a bag of peanuts."

"Eat 'em yourself," I replied, "and I hope they give you indigestion."

At this point we were interrupted by Murchison. "If you comedians will quit poking fun at each other and do some necessary poking around that engine and the float, *maybe* we'll get this ship in the air again."

The suggestion was well taken, and Miller walked forward on one of the floats. Taking the forward handhole off, he found about eight inches of water in the forward compartment. We had no way of fixing the damaged pontoon, bolts and special tools being required for the job. Luckily, however, we had a bilge pump aboard, so, while Miller climbed up to examine the engine, Murchison and I took turns bailing out the float.

(*Continued on page* 59)

XUM

Use of Planes Gives Increased Alfalfa Crop

THE wind whipping given an alfalfa field in full bloom by an airplane flying over it is thought to have resulted in an increased yield of 140 pounds of alfalfa seed an acre. This test was conducted on the farm of Jay Larkin, Cook County, Oregon.

In July when the alfalfa being left for seed was in full bloom the county agent arranged with Charles E. Hahn and Jonas Bass to demonstrate the effectiveness of the airplane propeller blast in tripping the alfalfa blossoms. A strip forty feet wide the entire length of the field was selected. The county agent and a group of farmers counted blossoms tripped and not tripped on the marked areas previous to the airplane treatment.

The airplane was then flown over the strip at a low elevation almost clipping the top of the alfalfa with the landing gear. The blossoms were again counted and it was found that 30 per cent additional blooms were tripped as a result of the air-blast from the ship.

Yields at harvest time proved that the strip thus treated yielded 200 pounds of seed an acre in comparison with the yield from the untreated portion of the field of only 60 pounds an acre.

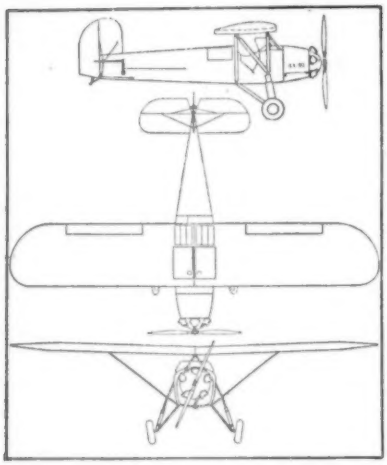
Upholstery Is Vital Factor in Sound Proofing

SAFER, swifter and more silent planes are objectives of manufacturers to meet the increased demand for air travel. Acoustical research with different kinds of materials has done much to curb the unpleasant noises inside cabin jobs, and the day when passengers can talk in normal tones while flying is at hand.

One of the important details connected with constructing quieter planes is the upholstery. Not long ago Dr. William R. Barss, consultant on acoustics of the Massachusetts Institute of Technology, made a series of tests to determine the sound-absorbent properties of upholstering materials. Using leather as a basis and considering its measure of sound-absorption as 100 per cent, a flat fabric upholstery was found to be 146 per cent sound-absorbent, cotton plush 192 per cent, chevron, a mohair velvet plush, 254 per cent, and moravia, another grade of mohair velvet, 308 per cent.

These results were largely due to the fact that the many spaces between the fibres of the softer materials act as "noise traps" to keep the reverberations from mounting to as high a level as they do in the case of hard sound-reflecting materials.

Scale Drawings of The Inland Super Sport



THE Inland is a two-place side-by-side monoplane. It is powered with a 110 horsepower Warner Scarab engine and holds the American speed and altitude records for planes of its class.

The specifications and performance data follow:

Span	30'-0"
Length	19'-0"
Weight Empty	916 lbs.
Useful Load	574 lbs.
Fuel Capacity	31 gallons
Top Speed	132 m.p.h.
Cruising Speed	100 m.p.h.
Landing Speed	45 m.p.h.
Climb	1650 ft./min.
Ceiling	19,650'
Radius	500 miles

The Inland Super Sport is an attractive plane with excellent performance.

England Builds Gigantic Flying Boats

"Scipio" flys over the Medway on a trial flight.

SUCCESSFUL trial flights were made recently from the Rochester seaplane base, Kent, England, with "Scipio," the first of three new metal flying boats, each weighing 14 tons, and driven by four engines developing a total of 2,400 horsepower, which have been ordered by Imperial Airways Limited from Messrs. Short Brothers, Ltd.

When they pass into service these new flying boats, which will be the largest British marine type passenger aircraft yet constructed, will be placed on the Mediterranean sections of the Imperial Airways routes to India and Africa.

Capable of attaining a top speed of 130 miles an hour, and cruising at 100 miles an hour, the new 4-engined boats will carry a paying load of 7,500 lbs.

A feature of the new craft, and one devised to cope with growing mail-loads, is that in addition to seating 15 passengers in a large and most luxuriously equipped cabin, they will have a large compartment in which there will be space for more than 1½ tons of urgent mails.

In addition to its passengers, mails and fuel load, each flying boat will carry a pilot, pilot-navigator, wireless operator, and a steward — the last-named presiding over a fully-equipped refreshment buffet.

Al Smith Has Never Flown

AL SMITH, Democratic candidate for the Presidency in 1928, has never ridden in an airplane, but he is considering an invitation given by Amelia Earhart while the two of them were standing atop the new Empire State building in New York city.

"You really haven't seen it until you've looked at it from the air," the aviatrix told him.

Pilotless Plane Crashes Near Hunter

OTIS JOHNSON did some skillful dodging and received a cut on the hand when a pilotless plane crashed six feet from him near this city.

The experience occurred when Lon F. Alford, navy pilot, jumped with his parachute from a 3,200-foot altitude as his plane went into an outside spin and got out of control.

Fragments of the cylinder head of the engine struck Johnson on the hand while he was hunting chicken hawks.

Alford was stunting a privately owned plane when he was forced to jump. The plane glided upside down over Johnson's head and crashed. Alford landed safely 200 feet away.

Mechanical Man Inaugurates Airline

MR. VOCALITE, the mechanical man, assisted National Air Transport at the Newark Airport in opening its new 31-hour transcontinental airplane passenger service.

Upon the command of his creator, J. M. Barnett, Westinghouse engineer, the robot provided the electric current which started the center motor of the Wasp motored Ford plane. With its load of eight passengers and 960 pounds of mail, the transcontinental plane sped down the runway of Newark Airport promptly at 9 a. m., on a flight which ended the following day at

Mr. Vocalite greets one of the passengers.

1:18 p. m. in San Francisco. The fare on these planes is $215 for the transcontinental trip.

Mr. Vocalite, who assisted so nobly in the opening ceremonies, is the most advanced mechanical man yet devised. He is actuated through spoken commands and performs all sorts of actions. He is able to sit down and stand up, turn on various electrical appliances, takes temperatures, watches safes and buildings, smokes cigarettes, is able to make a two-minute speech, and is fact the seventh wonder of the world.

Mr. Barnett, who developed the robot, explains that electrical impulses created by speech, are translated into light beams which, striking the mechanical brain in Mr. Vocalite, cause him to perform.

Airplanes Are Riddle to Savages

THE airplanes which fly over the shuttle line connecting San Jose, Costa Rica, with the Pacific Slope of Central America completely mystify a primitive tribe of Indians who live high up in the Pirris Mountains. The tribe is almost aboriginal in its mode of life, and only once in three or four years does a member venture into Costa Rica.

A youth arrived at the airport a few weeks ago, the first since the airline was started. He came barefoot and half-clad through the jungle, wearing a long shirt as a tribute to the civilization he was visiting. He reported that there was much speculation among the tribal leaders since the advent of the airplane overhead. Most of them believed the planes were held aloft by wires which were not visible from the ground, he said, and none of his people believed humans rode in the machines, as they hold that life is impossible at such altitudes.

For a week he loitered about the airport, bombarding the pilots with questions and being pulled from cockpits, paths of onrushing planes or from the way of whirling propellers. At the end of his week-long study of aeronautics he still remained so skeptical he'd not go aloft. He also scoffed at the stories told him of radio, telephone, talking pictures and other modern developments in industrial science.

Evidently under the impression that the pilots were joking and giving him false information, he left. Trousers and other clothing which he had been forced to wear while at the flying field were left in a neat pile and he went back to his people in the same shirt that he had worn when he arrived.

Electric Crank Saves Elbow Grease

ABOUT the only airplane in the Army Air Corps today which is not equipped with the electric starter is the Primary Training type, and an ingenious apparatus has been devised by the Material Division of the Air Corps to facilitate the starting of PT planes.

This device, termed the "external energizer," attaches directly, from an

electric outlet installed on the flying field (by the same principle as an electric iron is operated) to the crank fitting of the hand inertia starter. The energizer can be operated by one man, and materially accelerates the starting of the plane without the necessity of exerting undue physical effort necessary with the use of the hand crank.

In the absence of electric outlets on the flying field, the "external energizer" can be operated by means of a 110-volt D.C. gas engine mounted on a truck.

The Ruse that Saved Lieutenant Haight's Life

by LIEUTENANT J. M. RICHARDSON

ANYONE who has seen the possum do his stuff carries a recollection of how difficult it would be to improve on the animal's technique. The efforts of most humans to deceive seem crude in comparison.

There was an American aviator in France, however, who played possum more successfully—but that is getting a little ahead of the story.

Lieutenant Edward M. Haight of Astoria, Long Island, was a valuable member of the 139th Squadron, Second Pursuit Group. When September, 1918, rolled around, he and his comrades, led by experienced flight commanders transferred from our other pursuit groups and the French, began to look for trouble in that region bounded by St. Mihiel, Conflans, Metz and Pont-a-Mousson.

For a while hostile planes were scarce—a condition that did not exist for long. And one day members of Haight's squadron proved to their own satisfaction the aviator's axiom that if you don't find trouble it will find you.

They became mixed up in a beautiful dog-fight in which Fokkers and Spads shot dizzily about the sky in a diving, turning, twisting affair with guns running wild. There were Spads on Fokkers, Fokkers on Spads, and everybody went strenuously about his thrilling business of dealing out death.

Suddenly a Fokker plunged out of the melee, turned on its back and hurtled earthward. Right behind it a Spad slipped out of the combat for all the world as if it had been shot down, fell a few hundred feet in a side-slip, came back to an even keel and started on a long glide towards home. At a critical moment Lieutenant Germer's motor had gone bad on him and he had very craftily dropped away as if done for, starting a glide for our lines when he became sure none of the enemy were in pursuit. The battle was some distance in Germany, but he was able to make a landing within our lines.

(*Continued on page* 53)

Some Novelties of the Early Days

The radical designs of twenty years ago furnish an interesting comparison with present day achievements in airplane construction.

by JOHN B. RATHBUN

The Avro monoplane, an early cabin job. Note the radial engine, the mid-wing design and the cabin windows.
(From *Flight*, October 12, 1912.)

PERHAPS my slant on this thing is all wrong—who knows—but I always get a lot of pleasure searching through the files for old time inventions along aeronautic lines, and in hunting up the proud specifications of ships issued twenty years ago or more. And in these little journeys to the past I am continually digging up things that are mechanically very clever and practicable and well worthy of being revived for modern practice.

Just because some design fell into disuse many years ago is no reason why it is no good—always remember that many of the old time concerns failed because of commercial and financial reasons existing in the early years when aviation was still a plaything.

Very many ideas that are now claimed as new and original are really very old. If you don't believe it, just try to get out a patent. For example, did you know that an all metal ship with self-supporting cantilever wings took a prize back in 1911—just 20 years ago?

Again, do you realize that steel construction of the modern tube type was an old story in 1910? Well, these are the facts of the matter as you will find if you take the time and trouble to chase them up.

And again, deep, thick, flat-bottomed wing sections were proposed by Phillips back in 1884, long before any ship had left the ground! Think it over, those of you who believe that aviation started with Lindbergh.

It is very unfortunate that the earliest of the pioneers were afflicted with engine trouble and lack of development in engines for they certainly had ships that would put up a good performance even today. In their endeavor to get engines down to featherweight proportions before suitable materials were available, the builders fell foul of a whole lot of grief, but as a matter of design the engines were practically the same in 1909 as they are today.

The only difference between an engine of 1931 and 1909 is in the materials and the lubricants. Improved steels and heat treating methods for these steels have been of more importance in promoting reliability than any small changes in design that have taken place.

Almost any type of engine, in small sizes, was available in 1909:—radial engines, fan types, "Vee" types both air and water-cooled, straight sixes and eights, rotary cylinder types, two-stroke engines and others in profusion. The great trouble lies in the fact that the sizes ran 100 h.p. and below, and that most of the ships were propelled by 50 to 70 h.p. engines. It was not until wartimes that the constructors attempted to build large engines, and then, they overdid the matter as usual.

Most of the early engines were of the low compression type because the gasolines of that day did not permit of very high compression, therefore the output for a given piston displacement was comparatively low. Had ethyl gas or high test aviation gasoline been on the market at that time, then it would have been possible to run the compression up without getting into the detonation zone.

Back in 1908-1909-1910-1911, the engineer Breguet introduced so many innovations that it is almost impossible to list all of them within the confines of this article, and further, Breguet was so financed that he could carry out these schemes. In the first place he was one of the originators of the biplane fuselage and of the tractor type biplane.

Breguet was more or less a disciple of the Wright Brothers for he clung to the biplane idea and believed in the efficiency of low speed propellers—even though they did have to be geared down. He was one of the first to introduce the variable angle of incidence idea, and also built and used the first variable pitch propeller which is now being discussed with such profundity as something very daring.

Without going further into the many details of the Breguet ships at this point, we can say that he demonstrated the proof of his design by carrying six passengers, weighing a total of 924 pounds, at a speed of 53 m.p.h. with a 50 h.p. engine! It is interesting to note that the passenger weight of 924 pounds was very nearly equal to the weight of the ship—just 1,045 pounds.

Then, just to show that there were no hard feelings anywhere, he installed a 100 h.p. Gnome and carried 11 passengers (12 with pilot) at a speed of 55.9 m.p.h. This is pretty good for 1911—what do you think?

Breguet claimed that this performance was greatly assisted by the variable pitch propeller, for without this device it would have been impossible to take off with such a load using a rigid blade set for normal flight speeds. His automatic variable pitch propeller was arranged so that the blades were capable of motion about their edges, the amount of movement being controlled by springs acting against the air pressure. By this method, the blades at all times make the proper angle of incidence with the air stream insuring maximum efficiency at low speed as well as high speed.

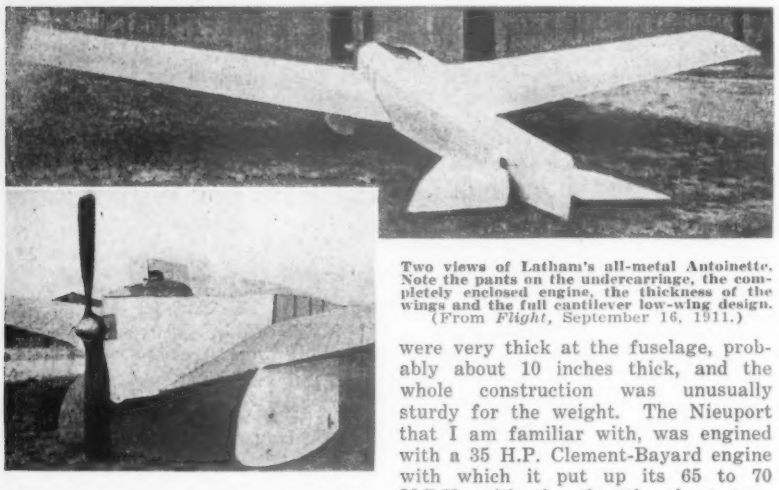
NOW we will look at another picture painted just twenty years ago—the armored Antoinette monoplane built for the French Army Competition in 1911. All vulnerable parts were covered with heavy armor and all external bracing wires and struts were eliminated, so that steel cantilever wings of the self-supporting type were

"The new British Army Breguet being transported from the works for shipment."
(From *The Aeroplane*, 1911.)

made necessary and thereupon made their first appearance.

For the first time we view wings with a flat under surface and over two feet thick where they join the fuselage. The landing wheels were covered by streamline armor plate so that we have the first "pants" on record—or at least tying the record of Breguet who used streamlined "harem skirts" purely for aerodynamic reasons in the same year. This heavy old crate was propelled at speed of 93 M.P.H. with a 70 H.P. Gnome. The wings on this ship were also of modern design, the thickness tapering down toward the tips while the undersurface was much flatter than was the commonly accepted practice of that time.

It is said that this was one of the first ships to be designed from wind-tunnel data and this is likely true since its designer, Eduard Nieuport, was a technically trained engineer. The wings



Two views of Latham's all-metal Antoinette. Note the pants on the undercarriage, the completely enclosed engine, the thickness of the wings and the full cantilever low-wing design. (From *Flight*, September 16, 1911.)

were very thick at the fuselage, probably about 10 inches thick, and the whole construction was unusually sturdy for the weight. The Nieuport that I am familiar with, was engined with a 35 H.P. Clement-Bayard engine with which it put up its 65 to 70 M.P.H. with the throttle about two-thirds open.

We get a good laugh out of the idea that a cabin monoplane is a recent invention for back in 1848 there is a promotional drawing of a steam driven monoplane with the nicest streamline body and passenger compartment that you ever saw. In 1890, M. Victor Tatin had the whole thing doped out very nicely with a pusher screw behind and a tractor screw in front. This was not put into practice, however, until 1910 when appeared under the title of the "Tatin-Paulhan." It had accommodations for two passengers and a pilot, and was one of the first ships to provide comfortable accommodations for the passengers. There were even pneumatic cushions to take up the shock. Equipped with a 100 H.P. Gnome, this ship attained over 70 M.P.H.

Then there was the Bleriot "Limousine" of the same year, built just like a limousine body with glass windows, flower-vases and everything. If there had been any attempt at streamlining this outfit, which there was not, it would have done much better than 50 M.P.H. with the 100 H.P. Gnome.

Yes, they had troubles about hangar and field rent even in those days, and there were a number of designers who thought it would be a wonderful idea if the wings could be folded back so that the ship could be stored in any shed or garage.

One of the first commercial folding wing ships was the DeMarcay-Mooney (1909) with its monoplane wings hinged to a slanting metal tube upright, this post also carrying the wing stays at the top and bottom. By turning a wheel in the cockpit, the wings could be folded back until they came together over the top of the fuselage like the wings of a beetle. Further, this little ship was provided with a steering gear connected with the wheels so that the ship could be controlled more easily while taxying over the field.

Retractable landing gear was played with from time to time through 1910-1911 accompanied by the usual crashes that took place when the mechanism got stuck or jammed or when the pilot forgot to let down the wheels when making a landing. The "Christmas Bullet" was one of the ships with this sort of arrangement.

THE doctrine of metal construction has been preached for a long time. In 1910, the Fairchild came out with a steel tube fuselage construction which in many ways was an improvement over those in use today. The longitudinals were tapered down in diameter from front to back so that the size and weight of the tubes was in proportion to the load carried, thus giving a very light structure.

Structural steel shapes (angles) were also used in the early Sturtevants and in the wartime Fokkers. Junkers, at a comparatively early date, started the corrugated sheet metal covering now used so extensively for wings and fuselage covering, while several smaller ships employed very thin sheet steel "fabric" for the wings. Back in 1909, a Chicago man built a wing structure of steel tubing that saw very successful service.

In 1910, the French Constructor Morane, produced an all-metal ship of the

(*Continued on page* 57)

The Pivot monoplane. Note the cowled radial engine, the use of struts instead of wires, and the floating ailerons. (From *Flight*, September 16, 1911.)

70 m.p.h. by a 100 h.p. Antoinette water-cooled engine—a sixteen cylinder "Vee" which was entirely enclosed. The radiators were streamlined along the sides of the fuselage.

Believing then (as most of the laity believe at the present time) that a multiplicity of engines spells safety, we note the Gould-Scientific American prize of $15,000 offered in 1911 for the first successful bi-motored ship. A number of builders tackled the problem in different ways, the only eligible entry—a Queen-Martin ship ending in disaster. The English "Short" was capable of fulfilling the conditions but as the prize was confined to American builders it did not get into the prize money.

A Le Grand bi-motor is said to have flown successfully at Juvisy in October, 1911, equipped with two 100 H.P. Gnomes. However, the bi-motor did not show up successfully in practice until the World War, although there were many ships of this type laid out on paper. One such proposed ship, shown in full detail by the London Graphic in 1912-1913, is almost identical with the Dornier DO-X, with a row of engines across the top of the monoplane wing and with a boat-like hull!

And then we get into the so-called modern type of monoplane with a truly stream-line fuselage. This palm we must award to the Nieuport of 1911 which proved its effectiveness by flying with a very small amount of power. The single seater flew very well with an 18-20 H.P. two-cylinder engine, while the larger two-seat model reached the then almost unbelievable

The First Aerial Passengers

TODAY, when aviation is going ahead in leaps and bounds, it is impossible for the laymen to name all the first persons to do this or that, in the progress of flying. Even the "air-minded" have a hard time trying to remember just where the first passenger route was started, or where the first air-mail was established.

Lindbergh, Kingsford-Smith, Amelia Earhart, Art Goebel, Ruth Elder and many others, are easily associated with the particular feat which they accomplished. However, no one remembers who the participants were in the first aerial wedding—excepting the couple themselves. The first baby who saw its first light of day in an aeroplane, is now no doubt, cutting its teeth unheralded. The first patient to be rushed from one hospital to another in an aerial ambulance, is perhaps, unknown. The first corpse that was transported through the air, no doubt, has only the usual inscription on the tomb above its final resting place.

Some few experts may be able to recall the names of some of these individuals—but what of the very first aerial passengers?

Reading from an old chronicle we find that on the 19th day of September, 1783, one Joseph Montgolfier, near Versailles, France, repeated an experiment he had previously tried at Annonay—an experiment in the ascension of a fantastically painted balloon.

The ascension was attended by the King and Queen and all the Court, to say nothing of a vast number of spectators.

The huge bag was inflated with hot air from a burning haystack. Monsieur Montgolfier, thinking the experiment would be more worthwhile if the swinging basket carried passengers—rushed to a nearby barnyard and brought forth the world's first aerial passengers—a cock, a pig and a sheep.

The passengers were caged in the gaily painted basket and the lines that held the great bag to its moorings were finally slashed. The balloon ascended to an elevation of fifteen hundred feet, landing some eight minutes later, about two miles distance from the starting point.

The following crowd were much concerned when they found that the cock suffered an injured foot, when he was rescued. However, the experiment was considered a success, especially after one villager testified to the fact that the foot of the cock had been trampled by the pig and the sheep before entering the basket.

Indians on the Air-Path

IT'S a long way from pony and war paint to airplane, but Chief Buffalo Child Long Lance, Blackfoot Indian of Calgary, Alta., Canada, has made it. A few days ago he took his tests at New York city and received a commercial pilot's license. He will engage in fur trading by air in the Northwest Territory of Canada.

The Inside Story of the Christmas Bullet

For the First Time in Thirteen Years the Designer of the Much Discussed "Christmas Bullet" Breaks His Silence and Grants an Exclusive Interview to a Representative of POPULAR AVIATION.

by DOC SCHNURMACHER

Dr. W. W. Christmas as he looks today.

"KILLED half a dozen men? The newspapers were crazy, son. They hounded me to death. I've never given anyone an interview before about my Bullet"! So spoke Dr. Christmas to this reporter, and in doing so, he broke a silence that dates back to 1918.

"Well, Doctor, how many were killed in the Bullet?" I asked this grizzled and taciturn Scotchman.

"Two," he answered, "Just two. And the manner of their deaths I'll tell you a little later. Let me tell you first about how the Bullet came into existence."

Dr. Christmas was the first man after the Wright Brothers to fly. Way back in 1890 he began the study of aviation by watching birds in flight to determine the hidden mysteries associated with soaring birds. He was especially interested in the food of birds and he quickly discovered that the amount of food the bird consumed, when changed into energy, was not sufficient to fly a bird more than from five to seven hundred yards. What then, was the answer to their sustained flight.

"I robbed the birds of several secrets, but not all of them," said Dr. Christmas. "I found that a bird's wing was flexible, enabling him to carry only the load necessary to float him. I consider that discovery to be one of the most important aerodynamic discoveries in the history of flight."

The second thing that Dr. Christmas discovered was that the trailing edge of a bird's wing had a sculling effect that gave him forward motion without effort. He found that this movement is automatic entirely, the bird having nothing to do with it. The automatic flexibility of the wing, the bird had nothing to do with either.

This automatic flexibility produces a condition which has been the despair of aeronautical engineers, that is, flexibility produces automatic washout and instantly relieves the wing of all static shock.

"In determining the value of flexibility," said Dr. Christmas, "I would put living birds on their backs and fill their wings and feathers with a cement that was light but firm."

"After the cement had dried, I would release the bird and I found that his efforts to fly were futile."

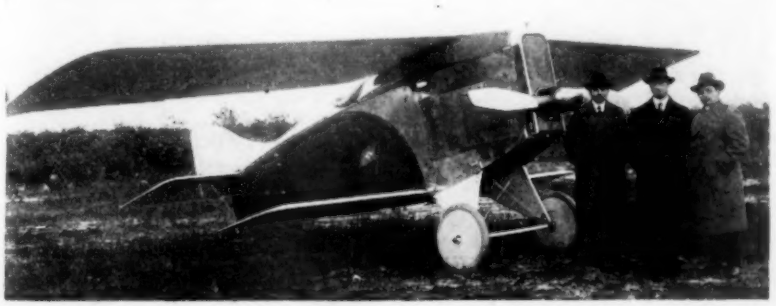
"Armed with this data, I built my first cantilever ship in 1918. The Bullet was a sesquiplane, with staggered wings. The upper wing had a span of 28 feet and a chord of 5 feet, while the lower wing's span was 12 feet and chord 2½ feet. Both the upper and the lower wing were flexible in three directions and the flexibility of the upper wing had an amplitude 2 feet from the horizontal, a total amplitude of four feet."

The spars were made of laminated high tensile strength steel drawn to a saw temperature. This allowed great flexibility without fatigue. The ship weighed 2700 pounds and was motored by a 6 cylinder Liberty motor of 185 horse power. Under numerous timing tests it made 222 m.p.h., a speed which has never been equaled when weight and horse power are considered.

"The men that were killed?" added Dr. Christmas, reflectively. "It was the breaks . . . bad ones. Lieut. Mills after flying her many times, took off from Amityville to see his mother at Staten

(*Continued on page* 60)

The notorious "Christmas Bullet" of 1918, one of the world's most extraordinary planes. Dr. Christmas stands in the center of this group.



Planes Unearth Archeological Treasures

WHO would ever suppose that an airplane would be helpful in locating ancient and lost cities which have been vainly sought by archaeologists for centuries? Yet such has proved to be the case.

The use of airplanes for this work was first discovered recently when a British squadron of planes, sent to make aerial maps of Mesopotamia, discovered that their photographs, made from a height of 3,000 feet, showed shadows on what appeared to be flat land. These shadows were viewed under powerful microscopes and seemed to be a city plan with the streets and houses dimly hinted at.

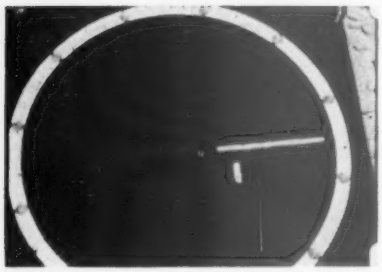
The aviators walked over the ground, studying it carefully, but no trace of the cause of the shadows could be located. The case was turned over to British scientists in Mesopotamia and these men fitted out an expedition to the site. Within 24 hours they found that there was indeed a buried city, the whole plan of which was as indicated in the photographs.

This case having worked out so well, an airplane expedition composed of three army planes was sent to Windmill Hill in Avebury, England, which according to historical records was the site of an old Roman encampment. Attempts had been made many times to excavate the community, with no success. The cameras were trained over the supposed location of the encampment. A complete record of the area was made showing shadows of the earthworks dating from the days of the tyrannic Caesarian rule in Britain.

Since the success encountered by this expedition, photographic flights have been made to various English localities, to locate the relics of a race dwelling there before the dawn of history. Up to this time great sums of money and much time have had to be expended before the excavations could be made. Often failure was the only outcome of such ventures.

Now, with the airplane and its photographs, a spot need not be excavated until the archaeologists are reasonably sure the shadows shown on the prints are those of the outlines of a ruined settlement.

Novel Airport Marking Guides Flyers



A view of the 100 foot circle as the flyer sees it. The panels shown here indicate a gentle east wind.

TO PROMOTE increased safety, when an airplane is being landed, by meeting several problems that have vexed pilots, a new mechanical system has been invented by Delbert O. Johnson and Romaine Warren, two young pilots, after two years of intensive work on their idea at the Riverside, California, airport.

The invention, which has been patented, shows a pilot exactly which runway he should use for a landing, thus avoiding any possible collision with another who is landing or taking off. It also shows a pilot the approximate wind velocity on the field.

First, there is a 100 foot circle, universally used on airports. From the center of this circle radiate four primary panels forty feet in length and sixteen inches in width. These are covered with flint glass so that the mechanism within them may not be injured with an airplane passes over the circle. There is a panel for north wind, one for south wind, one for east and one for west wind. Additional panels for variations of the wind may be used, too.

When there is no wind the panels all appear black. When a north wind blows sufficiently to actuate the control head, an arrangement that is placed atop some airport building, the electrical equipment in the apparatus causes the black section of the panel to turn over. This exposes a bright white surface the entire length of the forty-foot section. Because all the other panels of the circle appear black at this period, the oncoming pilot knows that there is a north wind blowing over the field—because the north panel is white. In this way he knows which runway to use.

Alongside these panels there are built comparable but smaller panels. There are three for each one which shows the wind direction. These smaller ones show wind velocity. When a wind of a low velocity actuates the control head, the first small panel shows white. For a slightly stronger wind the second panel appears white and for a still stronger wind the third panel shows white. As all the other small panels on the 100 foot circle are black, the pilot sees, at a glance, the wind direction and velocity.

The "rudder" on the control head has been so designed that gusty, variable winds do not cause it to change the general indication signs. If this were not so, ground signals might flash in confusion with every little change of the wind.

The entire arrangement is automatic and requires no attention from an airport attache. Airport officials are now studying it with a view of adopting it for universal use.

A New Training Plane

THE Travel Air Sport-Trainer is priced at $3,500, flyaway factory. This two-place biplane is powered with the four-cylinder Wright Gypsy 90 horsepower, air-cooled engine.

The two-place Travel Air Sport Trainer.

High speed, 103 miles per hr.; landing speed, 44 m.p.h.; rate of climb, 600 ft. per minute; cruising speed, 88 m.p.h. at 1700 r.p.m.; cruising range, 484 miles; gasoline mileage at cruising speed, 14.5 miles per gallon.

Length, 21 ft. in.; height, 8 ft. 10 in.; span, 28 ft. 10 in.; gasoline capacity, 33 gals.; oil capacity, 2.5 gals; total weight empty, 1075 lbs.; weight of pilot and passengers, 340 lbs.; total useful load, 650 lbs.; total gross weight, 1725 lbs.

Glider Pilot Flies While Blindfolded

"SPEED" WESTPHAL, test pilot for Mead Gliders, recently demonstrated remarkable control of his Rhon Ranger by making a complete takeoff, flight and landing while blindfolded. He said that the wind blowing against his face was of great help to him in controlling his glider properly. Three motor horns of distinctive tone were sounded by car drivers to help

"Speed" seated at the controls of his Rhon Ranger just before taking off on a blind flight.

him comprehend his location and to help him in making a landing. In his two years of glider flying he has completed over 6,000 flights with no injury to himself or gliders.

Questions and Answers Department

All questions of general interest on any phase of aviation will be answered authoritatively by Popular Aviation's Technical Staff.

BEGINNING with this issue, POPULAR AVIATION is inaugurating a Questions and Answers Department, which the publishers believe will be of great interest to its readers. This department is open to serve all readers of this magazine, just so long as their questions are of common interest to other readers, but it must be remembered that the publishers reserve the right to accept or reject any questions for publication according to their judgment.

We particularly solicit questions that will prove of interest or profit to the majority of our readers, questions on subjects of a more or less educational value, questions relating to mechanical subjects connected with aviation or the many problems entering into the operation, construction and maintenance of aircraft.

And now we start off with a number of questions received at the office of POPULAR AVIATION, typical specimens that have been accumulating in our files. This will give you a general idea as to the scope of Questions and Answers Department.

* * *

H. J. H., Milwaukee, Wis. Why do some objects pass through the air with less resistance than objects of different shape? For example, the body of a Zeppelin slips through the air with much less resistance than an ordinary cylindrical body of the same size. Why?

THE body or object that floats along and causes the least disturbance of the surrounding air meets with the least opposition or resistance. It takes a considerable amount of energy to set large volumes of air into motion, hence

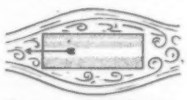


Fig. 1. A Cylinder Creates Considerable Air Disturbance.

Fig. 1B. A Streamlined body leaves almost no disturbance.

the body shape that stirs up the greatest amount of commotion in the air meets with the greatest energy losses. Frictional losses produced by the direct rubbing of the air along the surface of the body causes very little loss, relatively speaking. The air adhering to the surface tends to drag a lot of air after the moving body producing a "wake," and this in addition to the whirling masses of air, produces a very material loss in energy.

Thus, in Fig. 1-A we have a cylinder moving endwise through the air, setting up violent whirls and eddies and creating a vacuous drag at the rear, all of which absorb so much energy that this form is impracticable for a dirigible hull. In Fig. 1-B, a streamline body, the outlines are such that the air is displaced gradually and without whorls so that the resistance is at a minimum. Note that such a body is blunt in front and tapers out to a thin fine edge at the rear so that no vacuum is formed at the latter point.

* * *

G. D. T., St. Louis, Mo. How much more can a dirigible lift when it is filled with Helium than when it is filled with Hydrogen? Does Helium make it possible to construct a smaller balloon or airship than Hydrogen?

THE useful lift of a balloon depends upon the difference in the weight of the gas within the envelope and the weight of the outside air. Since the weight of a given volume of Helium (Density) is greater than the same volume of Hydrogen, it is evident that a Helium filled hull will have less lift than with Hydrogen.

The principal advantages of Helium lie in the fact that Helium is non-inflammable and that it has a lower rate of diffusion through the envelope than Hydrogen. On the other hand, Helium is very much more expensive and requires a larger envelope than Hydrogen, probably requiring from 15 to 20 per cent more volume. Helium is used mostly for the reduction of the fire hazard.

* * *

George Klovinos, Pawtucket, R. I. Do you think that rocket propulsion will ever become practicable for long flights? The simplicity of the rocket principle makes a great appeal to me from many standpoints as it does away with the complication of the engine, propeller and other mechanism now necessary for burning gasoline. The rocket is simply a mass of combustible matter incased in a metal tube, the latter being both engine and fuel storage tank. According to my notion, this is boiling down locomotion to its elementary principles, but I would like to have your views on the subject.

WHEN any fuel is burned, we require a fuel element such as gasoline or powder, and enough oxygen to combine chemically with the fuel so that the fuel is burned with the production of heat. In burning a carbon fuel completely, this will require about three times the weight of the fuel in terms of oxygen. In short, a combustible mixture will consist of 27.3 per cent of carbon and 72.7 per cent of oxygen by weight, and this is independent of the fact whether the fuel is burned in an engine or a rocket.

Now, when a gasoline engine is used, it is not necessary to carry the oxygen in the tanks for the engine sucks it in from the surrounding air, the only load carried being the weight of the fuel. With a rocket matters are very different for the oxygen or oxidizing matter must be carried in the rockets as well as the fuel so that the total weight in the rockets is about four times as great as the weight of the gasoline carried for the engine.

Under such conditions we can hardly expect a rocket ship to have the same radius of action as an engine driven plane regardless of refinements in the rocket. In other words, carrying a rocket mixture is equivalent to carrying four times as much gasoline as is necessary with present engines.

It would seem that the only possible way to greatly increase the radius of action would be to pump air into the rocket as needed and to avoid storing the oxidizing material inside the rocket. If this were done, it would introduce a pump and a lot of other complications so that the simplicity of the rocket would suffer.

Rocket powders carry oxidizing agents in the form of potassium nitrate or other compounds, and as a great part of these compounds consist of inert material, it is evident that a rocket mixture will weigh many times more than a gasoline giving the same amount of power. The oxygen carrying compound will always weigh more than the oxygen, hence if we say that a rocket mixture weighs six times as much as gasoline of equal content, we will not be far off on our reckoning.

* * *

Donald Carter, Jr., Jamaica Plain, Mass. I have heard of "Warren" interplane bracing for biplanes in a number of magazines but have not yet found this system of bracing illustrated. Does this system actually possess any real advantage such as reduced weight and increased strength, or is it simply another commercial sales stunt? It would seem that if the bracing system presented any real advantages that it would be used more extensively.

IN THE Warren interplane bracing system, borrowed from a system commonly used for trusses on buildings, all of the members are rigid struts instead of being alternately ties and struts as in the present Howe

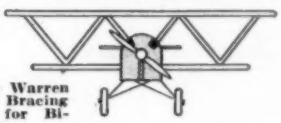


Fig. 2. The Warren Interplane Bracing System for Biplanes.

system. This is illustrated by Fig. 2 where the zig-zag streamline tube members are plainly shown, there being no stay-wires of any description.

This has the advantage of quick assembly and avoids the necessity of taking up stretching wires, but on the other hand, the system is quite heavy, and unless properly designed, may present a great deal of unnecessary head resistance.

* * *

E. D. R., Chicago, Ill. How fast will a ship dive without power, that is, with the engine cut out? Will it increase its speed indefinitely, like the bodies in the physics book, at the rate of 32.16 feet per second?

ANY BODY falling in a vacuum ranging from a feather to an airplane, will increase its speed at the rate of 32.16 feet per second. However, when a body falls through atmospheric air, as with the airplane, then its fall is retarded by atmospheric resistance and it soon reaches a velocity beyond which it cannot go. From this point on, it falls at a uniform rate of speed no matter how long it may fall.

Actually, the pull of gravity keeps on increasing the speed until the air

resistance finally becomes equal to the weight of the plane, and from this velocity the speed remains constant. For example, if the weight of the machine is 2,000 pounds (which is also equal to the pull of gravity) then the machine will continue to increase its falling velocity until the air resistance is also equal to 2,000 pounds, and then acceleration ceases.

The machine having the best streamline form and which presents the least resistance to the air will necessarily fall the fastest. If the falling speed of such a ship is greater than the pitch speed of the propeller, then the engine will have no effect.

* * *

Roger Quinlan, Rochester, N. Y. Many of the war-time bombers and large ships were provided with Deperdussin or "Dep" control systems according to the accounts of these ships. Please explain the difference between the "Dep" controls and the present day stick controls.

EXTERNALLY, at least, the old "Dep" control was quite similar to the controls used on many present day transports and large ships. It consisted of an inverted "U" shaped yoke, which on being moved back and forth, moved the elevator flaps up and down. On the yoke was mounted the wheel

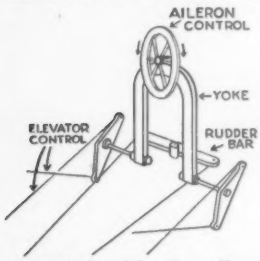


Fig. 3. A sketch of the Deperdussin controls from which the modern wheel control has been evolved.

connected with the ailerons, and for steering, a rudder bar was employed.

All of these parts are illustrated and named in Fig. 3 which is a schematic diagram of the Dep controls. This sort of system is quite powerful in operating large control surfaces, and is particularly adapted for use with large ships. It is, generally speaking, too heavy and cumbersome for the small size airplanes.

* * *

K. W. A., Peru, Ind. What is the purpose of adjustable pitch propellers? Do they give much better performance than the rigid type?

AN adjustable pitch propeller performs the same functions as the transmission gears on an automobile, at least in many respects. It permits the engine speed to change in respect to the speed of the airplane so that the engine can turn over at a more advantageous speed under certain flying conditions. For example, when the plane is just starting to roll on the takeoff, the pitch is reduced so that the engine can speed up and develop its maximum power which would not be possible with rigid blades set at the proper full speed flying angle.

While in flight, the propeller blades can be readjusted to a greater pitch, keeping the engine down to its normal revs and working with the blades at their most efficient angle with the air stream. In this way, the angle of the blades can at all times be adjusted so that the engine and the propeller are functioning under the best conditions which is not possible with rigid blades set at an angle for meeting average flying speeds.

* * *

J. A. D., Topeka, Kan. Please explain how an altimeter works. Does it measure from sea level or ground level, and how is the distance measured? Is this instrument accurate or are its readings only approximate?

AN altimeter is simply a special form of pressure gauge that measures the atmospheric pressure at different altitudes but instead of recording the pressure in terms of pounds per square inch, reads in the corresponding feet of altitude.

It is based upon the fact that the atmospheric pressure diminishes in direct proportion to the height, and in general, the altitude is read from sea-level as the level of the ocean is a universal base of measurement all over the world. However, the instrument can be adjusted to read altitudes above the local ground altitude or any other base that may be required.

Altimeters employed on airplanes are usually barometers of the "aneroid" type, consisting of a metal bellows connected to the pointer through a linkage system, the inside of the metal bellows being exhausted of air to form a high vacuum. When the outside air pressure varies, the bellows moves in and out so that the needle travels in direct proportion to the pressure.

When used as barometers, the instrument dial is divided in inches of mercury and when used as an altimeter the dial is divided into thousands of feet. To gain a long column and coarse divisions, the needle may make more than one complete revolution. This instrument is accurate enough for the purpose intended.

It may be of interest to know that the average altimeter can be used as a barometer, and that a sudden change in the readings of 300 or 400 feet when the ship is standing on the ground may indicate the approach of a storm or wind squall. If such a change takes place during flight, then of course, the instrument is in error by just that amount.

A radio type altimeter is far more accurate for it is not influenced by atmospheric changes and is really a positive means of measuring distance. In effect, a radio type altimeter measures the differences in electrostatic capacity between the ship and earth when the distance is varied. This type, however, has not come into extensive use as yet.

* * *

D. R. T., San Jose, Calif. What is a "supercharger" and why is it applied to airplane engines? Would a device of this kind be of any advantage on an automobile and how could one be built?

A SUPER-CHARGER is an air-compressor employed for the purpose of maintaining a pressure of mixture at the intake valves of an engine so that the cylinder will be filled with a full charge of mixture at all altitudes. In most cases it is a blower type of compressor, driven by gearing from the engine or by the exhaust gases.

This has been used on racing engines for some years past at the Indianapolis Speedway and elsewhere but it is hardly practicable for a passenger automobile except when the car is driven regularly at high altitudes. It is rather complicated and expensive.

* * *

J. K. L., Oshkosh, Wis. What is a "canard" type airplane?

A CANARD airplane is one that flies tail first. Many of the early planes were of this type, the builders believing that the tail would be more effective and capable of acting on a disturbance before it reached the wings.

* * *

G. G. Fuller, Dixon, Ill. When a large engine is placed in a motorboat, the torque tends to turn the boat over on its side. Is there a corresponding tendency toward turning an airplane over when the engine is opened up or is this compensated for by some other method? As I have it, the boat tends to turn in the opposite direction to the propeller.

THE reaction that you refer to is known as "counter-torque," or a turning effort that is equal to but in the opposite direction to the turning effort exerted by the engine on the propeller. This effect exists in airplanes just as it does in motor boats where a single propeller is employed. It is counteracted by setting one wing so that it gives more lift than the other, this wing being set at a greater angle of incidence so that it opposes the rotation of the ship. Any small difference that may exist can be corrected by the use of the ailerons.

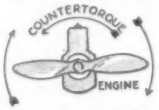


Fig. 4A. Torque and counter torque in a single engine plane.

Fig. 4B. A bi-motor neutralizes the torque by opposed rotation.

Fig. 4-A shows the conditions with a single engine, the arrow indicating the counter-torque of the engine being in the opposite direction to the propeller rotation. In Fig. 4-B, we have a two motor ship in which counter-torque is neutralized by running the engines in opposite directions. The turning couples are in opposite directions, hence there is no effect upon the ship just so long as the engines are equally loaded.

* * *

A. A. M., Louisville, Ky. Tractor type monoplanes and biplanes are most commonly used today. What advantages, if any, has a tractor type over a pushed plane, and why? A pusher type always appealed to me for the reason that the pilot and passengers have a clear view ahead, but I suppose that there must be some good reason why the early pushers were eliminated from the field in favor of the tractor machines.

AS YOU say, a pusher type ship has many advantages over a tractor, one decided advantage lying in the increased field of vision. Sitting forward in the nose of the fuselage or cabin gives the pilot and passengers an unobstructed view forwards and downwards.

From the standpoint of efficiency there are many points in favor of the pusher. The wing surfaces push ahead into undisturbed air which is one thing, and the lifting effect is not reduced by a whirling slipstream from the propeller as it is with a tractor.

(*Continued on page* 61)

XUM

Two English Girls Have Ambitious Plans

WORKING in boiler suits among other mechanics at Stag Lane Workshops in England are two girls. They are Miss Pauline Gower, the daughter of Sir Robert Gower, M.P. and her friend, Miss Dorothy Norman Spicer.

Miss Spicer is studying for her Ground Engineer's Certificate, the only other girl flyer in the world to hold one being Miss Amy Johnson. Miss Gower is studying for her "B" Pilot's License, to enable her to pilot for commercial and passenger purposes, Miss Winifred Spooner being the only other woman to possess one.

Miss Gower and Miss Spicer give a convicing demonstration of their mechanical ability.

These two girls have planned to open up a commercial flying company in partnership, but before doing so, Miss Gower is to make an attempt on the England to India flight record, with Miss Spicer as her mechanic. If this flight proves successful, the girls are contemplating making a more adventurous flight. The parents of both girls at first refused to sanction these plans, but the work of the girls has proved so proficient that they have now given permission.

Airline Tickets Now Widely Sold

THE old excuse that people don't fly because they don't know where to buy air line tickets is no longer good. Aside from the 40 offices of the company, it is possible to purchase American Airways tickets at 625 hotel, travel and tourist bureau agencies, 3,000 Postal Telegraph offices throughout the United States, 1400 Western Union offices in the New England area and at some 2,028 Missouri-Pacific Railway offices in the southwest; a total of 7,093 places where reservations may be made.

Other lines are taking similar steps to make air transportation convenient to the traveling public so that now anyone who wants to fly can do so without expending any more energy than it takes to reach for a telephone.

How to Report an Accident

DOES displaying news of airplane accidents in screaming newspaper headlines damage aviation?

Lieut. Donald E. Keyhoe, U. S. Marine corps aviator, does not think so. In fact, he believes that plane crash news is good advertising for aviation!

"More people fly after great airplane disasters than before," he said. "That's the way with American people—if something is talked up as being risky, they can't resist giving it a try."

Lieut. Keyhoe mentioned the accident in which Knute Rockne, Notre Dame university coach, was killed, and other smashups where many lives were lost.

"Thousands of people flocked to the flying fields after these disasters to get a glimpse of sister ships to the ones that crashed," he continued. "Many of these people went up in them."

But Zeh Bouck, who flew as radio operator on the first airplane flight to Bermuda last year when Capt. Lewis A. Yancey was navigator, has a slightly different opinion. He feels that crash news wouldn't do any harm if it was accurate, but he declares most of it is largely inaccurate.

"If a pilot periodically guns his motor when gliding for a landing, the inexperienced eye witness will say the motor 'was missing badly'," declares Mr. Bouck. "If the pilot slips his ship into a small field, the report is likely to read, 'the plane was completely out of control'."

Mr. Bouck makes a few suggestions to observers to aid in determining the cause of airplane accidents:

1. Note the direction of the wind, and the velocity—strong, gale or gusty.
2. If the propeller or propellers are not moving, note this fact.
3. Observe whether the clouds are high or low; if they touch the top of high trees or buildings.
4. Make special note of the general weather conditions; rain, snow or sleet.
5. Determine how far one can see straight ahead.
6. Observe in what direction the plane was headed when first seen.
7. Note the time in reference to the landing when the propellers stopped turning.
8. Finally, the witness is urged *not* to draw conclusions from what he has seen, but to communicate the *facts* which he has noted to an expert.

If these "rules" are borne in mind, Mr. Bouck sums up, aviation won't get so many undeserved "black eyes."

One Exciting Jump

by DANNY WILLIS

I AM an exhibition parachute jumper at the What Cheer Airport, Pawtucket, Rhode Island. On this particular parachute jump, it was about as close a call as I have ever had.

A great crowd had gathered at the field so the manager asked me if I would jump and I consented to make the leap.

As six o'clock I slipped into the harness of my 28 ft. back pack Irwin 'chute, and told the pilot to throttle down at 2,500 ft. directly over the field. There was little wind blowing.

At 2,500 ft. I climbed out onto the wing when I saw we were over the spot where I had judged would land me on the field. I bent down and dived head first off the leading edge of the wing.

I fell 1,500 ft. before pulling the rip cord, leaving only 1,000 ft. to get back on the field. I had fallen farther than I had intended to.

I looked down and saw everybody running across the field as if they were all excited—I looked down again and boy! what I saw made me sweat, and I don't mean maybe!

There was a whole row of high tension wires!

Well, I started to pull down on the lift web nearest the field but there was no wind to help me, and every time I slipped the 'chute, I went straight down towards the wires. Then I noticed I was going parallel with the wires.

I was only 100 ft. over them, but I didn't give up and gave another pull on the shrouds—this time a little puff of ground wind got in the 'chute and I missed the last wire by a scant 10 ft.margin and went down over a fence and into a potato patch.

The Author

I was so numb and shaky from that drop that I didn't hear the man who owned the potatoes giving me the devil for landing there, as the crowd had trampled all over his crop.

A car was waiting for me when I picked up the 'chute and went back to the hangar, where everybody said they had expected to send me home in a blotter.

But the next Sunday I made another jump and landed on the field, so I guess my nerves are O. K. again.

When the jumping season rolls around this year, I am going to attempt to capture the free fall parachute drop record now held by Rex Harper of the U. S. Navy.

The Autobiography of A Hoodoo Plane

I HAD better introduce myself to begin with. I am an Army plane, but no one pays any attention to me any more. When I crashed the sixth time they put me in the hangar and now they are going to junk me.

The first time I crashed it was because a mechanic tightened a control wire too tight and it snapped under the strain the lieutenant put me under. They thought that the wire had been of inferior material and so a mechanic put another one on when I went into the air again.

This time the mechanic made a bad splice and down I came again. Although neither of the crashes had been bad ones, two crashes in one day is pretty bad for an Army officer, so he was grounded. It made me want to cry to see the lieutenant eating his heart out when the other planes and pilots went into the air.

I was again pronounced safe and turned over to an instructor to replace his plane which a student had crashed. There was nothing wrong with my insides this time, but the student, who was soloing, had heard that I had crashed my first time in the air and was nervous. In fact, he was so nervous that the instructor started to keep him on the ground. If he had, my third crash might have been postponed.

When we hit a down current, the student froze to the controls. That is not a very healthy thing for a pilot to do while in the air, and the student must have realized it, for he pulled me out of the spin just before we crashed. He was too shaken to make a good landing though, and I nosed over. I had a broken prop and a badly splintered wing.

It was a week before I could fly again, but I was finally brought out on the field again. By this time I had a very bad reputation as a Hoodoo. The next student was so afraid of me that he nosed me over before he had taxied fifty feet.

They went over me carefully this time, but they did not notice that my elevator and rudder control wires were almost broken. They pronounced me air-worthy again, and I was taken up by Lieutenant Thompson, who had gained renown as a stunt flier. The wires snapped and I crashed, almost killing Lieutenant Thompson.

Now I am a hoodoo, going to be junked all because of careless mechanics.

School to Give Blind Flying Instruction

AFTER observing a series of blind flying tests conducted recently by the U. S. Department of Commerce, T. Claude Ryan, pioneer airman and head of the Ryan Flying School has announced that he will immediately include blind flight instruction with all transport courses.

JUNIOR ACTIVITIES
Edited by Paul W. Clough

FRANK GORE, 16, of Brooklyn, N. Y., is learning to fly at Valley Stream, L. I. He is working for his Private Pilot's License and then to build up time for a Limited Commercial License, for which, of course, he will have to wait until he is eighteen years old.

* * *

Bob Buck, 17, of Elizabeth, N. J., former Junior Trans-continental record-holder, is starting a Sky Scout Club of which we will have more information in an early issue.

* * *

Narada Coomaraswamy, 19, of Boston, with over 110 hours to his credit, is planning to attempt a transpacific flight from Seattle to Tokio, Japan. He now owns and operates a Cessna monoplane, but the plane he plans to use in the cross Pacific flight will be

Narada Coomaraswamy and his Cessna.

a Bellanca Airbus, equipped with a 575-horsepower Wright Cyclone.

Preliminary to his flight to Tokio, which he plans to make solo within the next few weeks, he will fly from Boston to California and back to familiarize himself with navigation problems. He will try for a standing prize of $25,000 for a successful flight from America to Japan, offered by a Japanese newspaper.

* * *

Stanley Brown, 18, of Garden City, L. I., is back from Culver Military Academy for the summer vacation. He will have to start catching up with his flying time as he doesn't have a chance to fly at the school. Stanley completed his instruction and received his Private Pilot's License during last summer's vacation. He learned at Roosevelt Field in a Fleet.

William Vanderminder, 16, of Hempstead, Long Island, recently soloed at Roosevelt Field after seven and three-quarters hours of instruction. He is now working for his Private Pilot's License. William has been interested in aviation for about a year, but had to wait until he was sixteen before taking his course. William is flying a Fairchild K.R. 34 biplane.

* * *

George Dade, 18, of Roosevelt Field, recently had an accident with his Aeronca monoplane. He was taxying down the field in back of some ships when a gust of wind ground-looped his ship into an Aristocrat. It did quite a bit of damage to both ships and it will be a while before George takes to the air again. Fortunately no one was hurt.

* * *

Horace Jernegan, 16, successfully passed his flying tests for a private pilot's license at the Providence Airport, Seekonk, Mass., on June 2nd.

Horace's plans for the future are more definite than might be expected. He has his mind set on the purchase of a Bird or Kittyhawk plane. He has a cousin who is a transport pilot and hopes to get him to go into business with him. While building up enough flying hours for a limited commercial pilot's license, Horace will have his cousin do the commercial flying for the organization. Passenger hopping and instruction will provide enough income to pay the expenses until he can fly commercially, Horace believes.

* * *

Arthur Romaine, 17, and Fred Davis, 17, of Jamaica Sea Airport, Long Island, fly to Roosevelt Field quite often. They are usually piloting Wacos and Eaglerocks.

* * *

Well the summer is here now and we ought to hear quite a bit from the Junior pilots. How about some of you Junior pilots writing me and telling me what you are doing and something about yourself?

A New Navy Fighter

WHAT is claimed to be the fastest two-seater fighting plane in the United States, a refined Vought-Corsair type biplane powered with a supercharged 600 horsepower Pratt & Whitney Hornet engine is now in use by the U. S. Navy.

The new plane was designed by engineers of the Chance-Vought Corporation in co-operation with the Navy Bureau of Aeronautics. It is said to have a speed of 190 miles an hour with full load and a cruising speed of 160 miles an hour. Landing speed is fifty-five miles an hour. The undercarriage is streamlined with "pants" over the wheels and the supporting struts are built to lower the resistance to air.

A newly designed cowling covers the engine. The wings have extra strength to withstand the terrific strains of catapult operation. The landing gear is so arranged that the craft can be converted into a seaplane or amphibian.

XUM

Practical Lessons in Flying

by JOHN B. RATHBUN

Cross Country Flying and Cruising Radius

BOB, the student, and Ed Keith the pilot-instructor, sat on a bench at the airport discussing their cross-country flight from Hometown to Edgebrook made the day before, a trip that had not been all that they had hoped for by any means. They had carefully plotted out the flight according to standard methods, had made due allowances for wind and compass corrections, but unfortunately the wind had swung around before they had more than half completed the trip.

This upset all calculations and made it necessary to complete the flight by the landmark method rather than by calculation. In fact, the wind had swung around by a good 90 degrees when they were about halfway to Edgebrook, and as Ed had said nothing on this subject at the time, the instructions were delayed until today.

"Well, that's the way it goes," remarked Ed the pilot, "I lost my rabbit's foot yesterday and broke a mirror to boot, so we can hardly hope for a heck of a lot of luck with all these calamities at hand. Just about the time that I waste a day drawing a dozen diagrams for some guy—bloop goes the wind and the diagrams are just so much waste-paper."

"Maybe it is just as well that this did happen," answered Bob, "it gives me something to think about outside of the regulation dope and opens the way for some more of your wise instruction and counsel. I'd a whole lot rather have this happen now than after I had completed the course. As it is, I can put the explanations up to you instead of having to wear out my own brain cells on the job."

"Glad you are so charitable—and so lazy," said Ed, "but maybe you're right at that. To tell you the truth, I wasn't paying much attention to the ship until I happened to look overboard and missed some mighty familiar scenery that we should have been passing over at the time. Then I took a good look around and saw that the smoke from the chimneys was making an angle of about 30 degrees with the course instead of pointing at nearly right angles as it should have been doing. Just as a little suggestion, keep a look out for the direction of smoke streamers, flags or ripples on the water for they instantly indicate a change in the wind direction.

"When you get up to altitude after the takeoff," Ed continued, "note sharply the angle that the wind is making with the ship as judged from the chimneys, windmills or flags. Check up on this every so often and keep informed of any changes that may be taking place when you are flying a compass course. The wind may change direction naturally or else you may run into a different wind strata by flying at a higher or lower altitude than that at which you laid out the compass course.

If the wind changes naturally, then sometimes you can make a very simple correction by climbing higher or flying at a lower altitude until you strike a wind that blows in approximately the same direction as the wind that you originally figured on. If this cannot be done, then you must make an estimated correction from the change in the wind."

Ed reflected a moment, and then added, "About the surest check-up on any variations that may take place is to make up an approximate time and landmark table from the map at the same time that you are laying out your compass course. From the diagrams you can determine the course speed, and this data, together with the distances shown on the map will enable you to determine the time at which you should arrive at different points on the course. If you don't pick up the landmarks as you should, then you know definitely what to do about it."

"Just how should such a table be arranged?" asked Bob. "Please lay one out from the map just as an example."

Ed took a piece of paper, sat down at the table, and then made a series of notes that would serve as a guide to a projected flight from a town that we will call Centerville to another town, Baywater. The time was carefully computed from the speed on the course, and the final result was shown in the accompanying table.

Centerville to Baywater

Time	Miles	Compass	Landmarks
12:00	00	57°	Start. Climbing for height. Altitude 3,000 feet.
12:10	12	"	Harmon Village. Triangular patch of woods to right.
12:20	24	"	Thorn hills, ridge running N. and S.
12:26	31	"	Illinois Tile Co. Factory. Long Buildings—Two Stacks.
12:30	36	"	Wooded area, about one mile square, three bldgs.
12:37	47	"	Cat Creek, stream bounded by trees.
12:40	48	"	Open fields.
1:00	60	"	Village of Hersey. About a dozen houses.
1:10	72	"	Fredonia Village. Large brick factory to north.
1:20	84	"	Baywater. About two miles square. Airport on North Edge of Town—fully equipped.

A typical time and landmark table as Ed, the instructor, laid it out.

"THIS sort of table has compass flying licked if the visibility is good," said Ed. "If we have a railroad to follow, a river or a bright white concrete highway along the line of march, matters are still further simplified and we will not even need the table. However, there are conditions where compass flights are absolutely necessary, and it is for these conditions that we must make preparations.

"In finding your bearings by landmarks, it is a good idea to set your watch on the hour, that is, set it at 12:00 at the start. This simplifies the timing as indicated in the proceeding table. In this table, I have set the readings at about 10 minute intervals, which might be considered too often by some but I find this about right because you can go a long distance in 10 minutes and possibly out of sight of a good landmark. If any specially prominent landmark is to be encountered within 10 minutes, then the proper interval is noted as above.

"In picking out landmarks, it is not wise to list hills and valleys," said Ed, "unless the hills stand out prominently in a flat country. At an elevation of a few thousand feet, the hills and valleys look alike and it is almost impossible to distinguish a hill or a valley at 3,000 feet. The most desirable landmarks are railway tracks, lakes, rivers, concrete roads, towns or woods.

"The general shape of the woods or towns should be studied in advance for at an elevation of 5,000 feet or more, the streets cannot be recognized and the whole town appears like a black smudge. The direction in which railroads intersect and enter a town are also worthy of observation, and if the town is located on a lake or river, this fact should be carefully noted.

"If Weather Bureau Reports can be had, they should be consulted before starting out on a long flight," said Ed, "and even with these reports at hand it is a good thing to have a barometer handy around an airport. If the needle of the barometer should drop suddenly, indicating the existence of a lower atmospheric pressure, it is an almost certain indication of an approaching storm.

"The total amount of the drop, or the suddenness with which it takes place, are as a rule, a measurement of the severity of the storm. Wind squalls, thunderstorms almost invariably follow sudden barometric fluctuations which are not far distant. Therefore, before we start out on another cruise I ad-

vise you to look at our barometer and note whether the black hand is above or below the fixed reference hand.

"Weather conditions have a great deal to do with cross-country flights aside from the direction of the wind," explained Ed, "for increased cloudiness means poor visibility as a rule and poor visibility, of course, makes it difficult to fly by landmarks. For this reason, aside from dangers attending a squall or storm, a rapidly falling barometer is of the greatest importance, and a student should never set out on a trip when the barometer warns him of adverse weather conditions.

"Fogs or haze may so completely mask the details of the earth that they will mislead the pilot even though he believes that he sees enough for a true course. Of course it is possible to descend closer to earth in such cases, but that is not all that is necessary for the aviator does not want to see details house by house or tree by tree but wishes to gain a general view of things for a distance of ten miles or so in every direction.

"If the visibility is so poor that he must come close to earth, then his radius of vision becomes more limited, and within limits, the higher he flies the more closely the earth resembles the map that he is using. At 5,000 feet elevation it again becomes difficult to recognize landmarks because they then become blurred and indistinct purely because of the distance. An aviation map is a picture, and the higher the ship flies the more nearly the ground approaches the scale to which the map is drawn, so that with good clear air and good visibility, high flying makes for easier flying."

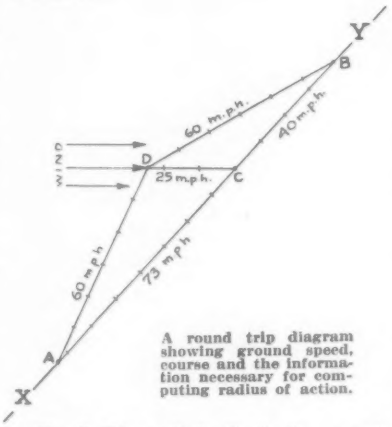
"Just how did you figure out the amount of gasoline required for making this trip?" asked Bob, "On the outward trip we flew with the wind while on the return trip we came with the wind and covered the distance faster in less time and with less fuel. Seems to me this is one of the important things to consider and I would like to get the dope on it. I think I understand the elementary part of compass flying so far as getting to my destination is concerned, but I am still hazy on the subject of fuel or the radius of action of the ship."

ED thought this over a minute, and then hiding a grin with difficulty roared out: "Say, did they ever teach you anything at the ground school or didn't you pay any attention to them? Here we are cooped up in the shed on a swell flying day when I'm rarin' to go, and all we do is to go over a whole lot of ground school stuff that you should have had long ago. Well, I suppose that we will have to make the best of it and work on what we have—not what we would like.

"To begin with, the pilot must know how many hours his ship can stay in the air while traveling at its most efficient speed—the cruising speed—or at high speed. The greatest round trip distance or "radius of action" is attained at cruising speed which is somewhat lower than the maximum speed. Thus, if the maximum speed is 135 M.P.H., then the cruising speed will be in the neighborhood of 110 to 115 M.P.H.

"It is therefore apparent that if the cruising speed of a given ship is 110 M.P.H. and it can carry sufficient fuel to drive it for six hours, that the total distance flown in a straight line will be: $6 \times 110 = 660$ miles. If driven at top speed, both the duration in hours and the radius of action will be reduced for the reason that more power and more fuel will be required. Likewise, the machine will be less efficient at speeds lower than cruising speed."

"Isn't that what they call the 'Optimum speed'?" asked Bob. "The speed at which the least fuel is consumed for the fully loaded machine at a standard altitude?"



A round trip diagram showing ground speed, course and the information necessary for computing radius of action.

"Yes," Ed replied, "both the speed and the loading have an effect upon the fuel consumption and of course the altitude must be considered because at very high altitudes the ship must fly faster in order to get sufficeint support from the very thin light air that passes over the wings.

"Now just for an example, let us assume a ship that carries enough fuel to last for six hours at a cruising speed of 110 miles per hour, and that this ship is to make a round trip of such length that the fuel will be completely exhausted. In that case the

$$\text{radius of action} = \frac{110 \times 6}{2} = \frac{660}{2} =$$

330 miles.

"Thus, this ship will fly 660 miles in a straight line in six hours, and the round trip distance measured between two points will be half of 660 miles or 330 miles. This can only be the radius of action in still air, and if there is a wind we must allow for it.

"Let us say that the ship is to make a round trip in a wind of 25 M.P.H., the wind being with him on the outward trip and against him on the return trip. The duration is to be six hours as before while the cruising speed still remains at 110 M.P.H.

"The first step will be to compute the earth speeds independently for the outward and return trips. In one direction we add the wind speed to the cruising air speed and in the other, the wind speed will be deducted. Then the speed on the outward trip = 110 + 25 = 135 M.P.H., and the speed on the return trip = 110 − 25 = 85 M.P.H.

"From this we see that the ratio of the outward to the return trip speed is 135 to 85 or 1.588. The ratio of the return to the outward trip is 0.63. These ratios can be resolved into a general rule or formula which reads as follows, the letter (G) representing the number of hours flight duration permitted by the gasoline tanks."

Radius of action (round trip) =

$$G \times \frac{\textit{out speed} \times \textit{return speed}}{\textit{out speed} + \textit{return speed}}$$

"Expressed in the figures given for this particular case, we find that the

$$\text{radius of action} = 6 \times \frac{135 \times 85}{135 + 85} = 6 \times$$

52.16 = 312.9 miles.

"THE rule worked out here presupposes that the wind is blowing directly along the course and parallel to it, but as the wind more frequently makes an angle with the course, we must draw a diagram to find what components of the slanting wind are acting on or against the ship. A diagram of this sort is shown by Fig. 1 where the air speed of the ship is taken at 60 M.P.H.

"The wind speed is 25 M.P.H. and is drawn to scale on the line (D-C). The air speed lines to scale, (A-D) and (B-D) intersect the course line (X-Y) at (A) and (B). Thus, the outward speed (A-C) is 73 M.P.H. while the return speed (B-C) is 40 M.P.H. These resultant speeds are then used just like the outward and return speeds in the first formula and the radius of action =

$$6 \times \frac{73 \times 40}{73 + 40} = 155.0 \text{ miles.}$$

"Now, while this is the actual radius of action under the given conditions, it will be safer to allow for wind fluctuations, say cut 20 per cent from the above radius of action to make up for the many variables that take place in flight. It don't pay to cut things too short in a case like this, and should we meet with adverse conditions, just like we did on our cross country flight of yesterday, it will be mighty nice and comfortable to have a little reserve gasoline on hand."

"Just how do we figure out the gasoline hours (G) in this formula when the size of the tank is not known?" asked Bob. "We might know how much a certain make and model of engine consumes per hour, but that doesn't give us the figures."

"This is simple when you know how," returned Ed, "just one more omission from that blankety-blank ground school where you have been wasting your time or theirs. First, we must know the weight of gasoline consumed per horsepower by the given type of engine, and then compute the amount taken per

(*Continued on page* 55)

Boeing Monomail Improved

THE Boeing Monomail, low-wing, all-metal monoplane, which will go into production very shortly, has had its performance improved by minor changes suggested by sixty days' service flights on the Chicago-San Francisco line.

The remodeled Monomail is twenty-seven inches longer, added forward of the front spar. In addition to increasing the length, the forward section has been tapered, the cabin seating arrangements changed, pneumatic tail wheel installed, together with improvements in the fuel and oil systems, battery and dynamotor location, cabin ventilation and a new type of ring cowl.

The Monomail, which carries seven passengers and 500 pounds of mail, or 2300 pounds of cargo, is said to carry the heaviest pay load at the highest cruising speed of any single-engined plane in service.

Souvenirs of the Akron

METAL punched out during the manufacture of girders, and other duralumin scraps accumulating from the construction of the new Naval airship AKRON, are being used for the manufacture of souvenirs.

Book marks, letter openers, key rings and similar objects are stamped from the larger pieces of scrap, while smaller material is melted and cast into such objects as miniature elephants suitable for paper weights, and a money bank that is a replica of the giant airship dock at Akron, in which the new Zeppelin is being assembled.

While the selling price of the souvenirs is so low that considerably less than the original cost of the metal is realized, the venture has proved to be more profitable than if the scrap had been sold as junk. Duralumin, it is claimed, cannot be melted and reformed into airship and other parts without a decrease in strength.

New Lindbergh Plane

YEP. This is it. Looks big and powerful, doesn't it?

It's Lindbergh's low-winged Lockheed Sirius plane after it had been fitted with pontoons. Besides keeping it afloat, each pontoon will carry 150 gallons of gasoline.

This is the plane in which the famous flying couple plan to fly to Japan.

The Disheartening Experiences of a Glider Club

by R. W. ARBO

I WOULD like to relate a few incidents concerning the activities of a glider club that I had charge of in Chicago, while I was an instructor at Sky Harbor. This article will show some of the prejudices and obstacles that the club was forced to overcome which greatly hindered its success. They say that misery loves company and I feel that perhaps this story may serve to encourage other clubs and individuals who are having tough sledding.

This club was formed mostly of boys from seventeen to twenty years old from the north side of Chicago. Plans for construction of a glider were secured from the National Glider Association and most of the work was done in the basement of an apartment house, much to the annoyance of some of the tenants above.

Careful supervision and the use of good material resulted in a real job and favorable comments were made by outsiders and other instructors who understood aircraft construction. I mention this to show that the following incidents were in no way fostered by the fact that the machine was poorly constructed and therefore dangerous.

The day for the trial finally arrived and the knocked down machine was put on its trailer and hauled out to an old flying field west of the city. Most of the first two days were consumed in setting up, making minor adjustments, testing and waiting for favorable winds, etc.

Finally we were all set and I made several short towed flights which attracted quite an audience from the adjoining highway.

About this time, the County Sheriff strode majestically through the crowd and announced that I was under arrest. I was too surprised to remember much about his next few remarks but they had to do with fines and jail sentences.

It developed that this field had been closed to flying, a fact that was news to me as an OX Swallow had set down there several times while we were assembling our machine. Several of the bystanders tried to take our part by protesting vigorously to the sheriff but all to no avail.

However he finally gave us thirty minutes to get off the field and that closed the matter. Needless to say, this was a deep disappointment to the fellows who had spent all their spare time for months on the machine and were looking forward to their turn at the stick.

Our next try was at a private field farther west where we were told that no gliders were allowed. This was stated in no uncertain terms immediately on our arrival and while it didn't help us any, it did forestall the annoyance of taking the machine off the trailer and assembling it all for nothing. The crushing blow of this episode came when we were asked to haul the machine away from the edge of the field as they said it looked like a cracked up airplane and gave them unwanted publicity.

Above, the author takes on a passenger for a towed flight. Below, this outfit covered many weary miles before locating a suitable flying field.

The next attempt was made at Myers field in Morton Grove, a field which I have set down on many times. I knew it had been closed to commercial flying but I thought we might be able to use it temporarily for shock cord flights as it was so far out of the city.

However, the setting up operations drew such a crowd that a flock of motor cycle cops soon appeared with screeching sirens and we were again ordered off. Only the greatest of determination in the hearts of the club members ever carried them through all these repeated disappointments which were unusually hard to take, as, up till now, none of them had even sat in the machine.

Some of the readers may criticize me for not taking it out farther to "safer territory" in the first place, but it must be remembered that the process of mounting and trailing it out and back through fifty or seventy-five blocks of Chicago traffic every day was no small item. The fellows even got bawled out once for getting on a boulevard as the cop thought they had a load of bill boards or something, and trucking was prohibited.

The problem of a field was finally solved through the kindheartedness of a farmer who had a place about twenty miles west of the city but as we made

(*Continued on page* 56)

Armless Woman Flies Plane

A WEALTHY woman, who is a rancher and sportswoman of Southern California, flies an airplane although she only has stubs six inches long for arms. She piloted her plane alone through all maneuvers required for a pilot's license.

Instead of the regulation short control stick, her plane was equipped with a stick extending shoulder high. At the top of the stick is a padded forked rod in which she inserted her shortened arms. The pilot's seat is raised so that she can see out and the foot rudder bar moved up and back. Switches and throttle control were so arranged that she could work them with her fingerless members.

She says that she can pilot a ship easier than she can drive an automobile, and she gets her greatest thrill out of flying. Her instructor said she had more nerve and ability than many men students.

The Duties of a Flying Cop

WHATEVER New York's flying cops complain about, they can't kick over lack of variety. Their latest job was wished on them by the Reverend Christian Reisner.

Dr. Reisner had a peeve against the "Voice of the Air," a big, tri-motored job owned by the Plane Speaker Corporation and piloted by L. S. McGinnis. He complained that the broadcast from the "Voice of the Air" was entirely too loud—positively nerve-racking.

So Pilot Schmidt (in Lumberjack) and Bill Slater (at right) zoomed aloft in the police department's new Fleet, Bill with an altimeter strapped to his chest. But Pilot McGinnis is a clever fellow and the cops couldn't catch him flying lower than the 2,500 feet required by law. There isn't any law against broadcasting from a plane, so the flying cops couldn't help the preacher.

Three New York cops with their Fleet plane.

Incidentally, there have been lots of complaints about broadcasting from airplanes. Possibly a new law would at once serve the public and give the Gotham air cops something to do besides checking altitude.

Model Flying Requires Caution

THE rapidly increasing popularity of model building and flying competitions has resulted in large crowds gathering to witness this fascinating sport. The risk of hitting an onlooker with a model is very small, but still there is some risk. Some day it is going to happen.

In this country no serious accident has befallen an onlooker or a contestant. But then we all know that there is considerable movement toward heavy rubber driven models as well as increasing popularity for springs, rockets, compressed air, gasoline and steam models. Many of these models range from one to ten pounds in weight. It is then easily imagined what damage one could do in a dive into a crowd.

The time is coming when fields where the public congregate will have to be discarded by model builders who wish to fly models weighing more than three or four ounces.

In many cases the model builders have been granted the use of public places. Some precaution must be taken to protect the public and to guarantee the absence of a nuisance.

It is a good thought for the model clubs and the individual flyers to bear this in mind and take steps to protect themselves from suits arising from injury to spectators.

Believe It or Not

Air travel is cheaper than spaghetti. For air travel costs only 7 cents a mile!

A Daredevil Stunt

A SEAPLANE and a Gipsy Moth recently flew under the roadway level of the new harbor bridge at Sydney, Australia, a daring feat when one considers the 174 feet to the water level. The planes were piloted by the New South Wales Aero Club pilots who wished to be the first to perform this feat.

A New Cabin Plane

THE 1931 Travel Air-6-Place shows a number of improvements in streamlining over the previous models of this well-known plane. It is powered with a 300 h.p. Whirlwind engine and is priced at $12,435.

High speed	140 m.p.h.
Climb	900 ft. min.
Landing speed	60 m.p.h.
Cruising speed	115 m.p.h.
Range	560 miles
Length	31 ft. 5¼ in.
Height	9 ft. 3 in.
Span	48 ft. 6½ in.
Gasoline capacity	90 gals.
Oil capacity	7 gals.
Gross weight	4420 lbs.
Weight empty	2707 lbs.
Useful load	1713 lbs.
Passengers	1020 lbs.

How I Taught Myself to Fly

by AL THOMAS

SHORTLY after the close of the war I was in the machine shop business out on the Pacific Coast. Most of my work was on speed-boats.

I had done some work on a large speed-boat and the owner couldn't pay me in cash, but gave me an airplane instead. It was a J I Standard, powered with an A7A motor which I understood, but didn't know the first thing about the plane. I had an old-timer test hop her for me and he O. K.'d her, so I asked him to sell it for me.

He looked at me kind of funny and said, "Why don't you learn to fly her?"

I told him I didn't know anything about an airplane or flying, though I had been up several times and liked it. He explained to me that there was nothing mysterious about it, and that it was as simple as A B C. All that was necessary was an application of common sense.

So after he explained the ship to me and gave me a few lectures on the theory of flight I got the "bug" and decided to try. But I adhered strictly to his instructions and started in by "grass-hopping."

I would give her enough gun to get her tail off the ground and taxi around a large field till I got the feel of the plane. I did this for an hour a day for a week. I found that the hardest thing to conquer was the proper manipulation of the rudder bar, for it is just the opposite of steering a bicycle or a bobsled. However, I got used to it in a few days.

Then the next week I started taking her off the ground about four or five feet. I would keep kicking the rudder till I felt it getting stiff, which told me that she was getting up to flying speed. About the time that she left the ground I would close the throttle and as I felt her stalling I would pull back gently on the stick and let her settle.

After an hour of this a day for a week I could make a perfect three point landing. Then the next week I took her up about ten feet and set her down. Then the next week twenty feet. Then thirty, forty, fifty and sixty. There were trees alongside of the field which enabled me to guess at my height.

By this time I had close to fifty hours in and began to get an idea of what it was all about. The ship was fitted for

(*Continued on page* 56)

How to Build the Whipper-Snapper

Popular Aviation presents a tricky little model that is easy to build and fast.

by POP STICK

KEEPING in line with last month's promise, we are presenting as a second model this very consistent speed flyer. It is simple in construction, low in price, and the results obtained will be most gratifying.

No detailed written instructions will be given, as the drawing in itself is very complete. The photograph shows the finished model, and with abbreviated instructions, the builder should experience no trouble.

One word of caution, that is, in reference to the propeller: a low pitch is the only type that will work successfully on this model, being all Balsa and fairly heavy.

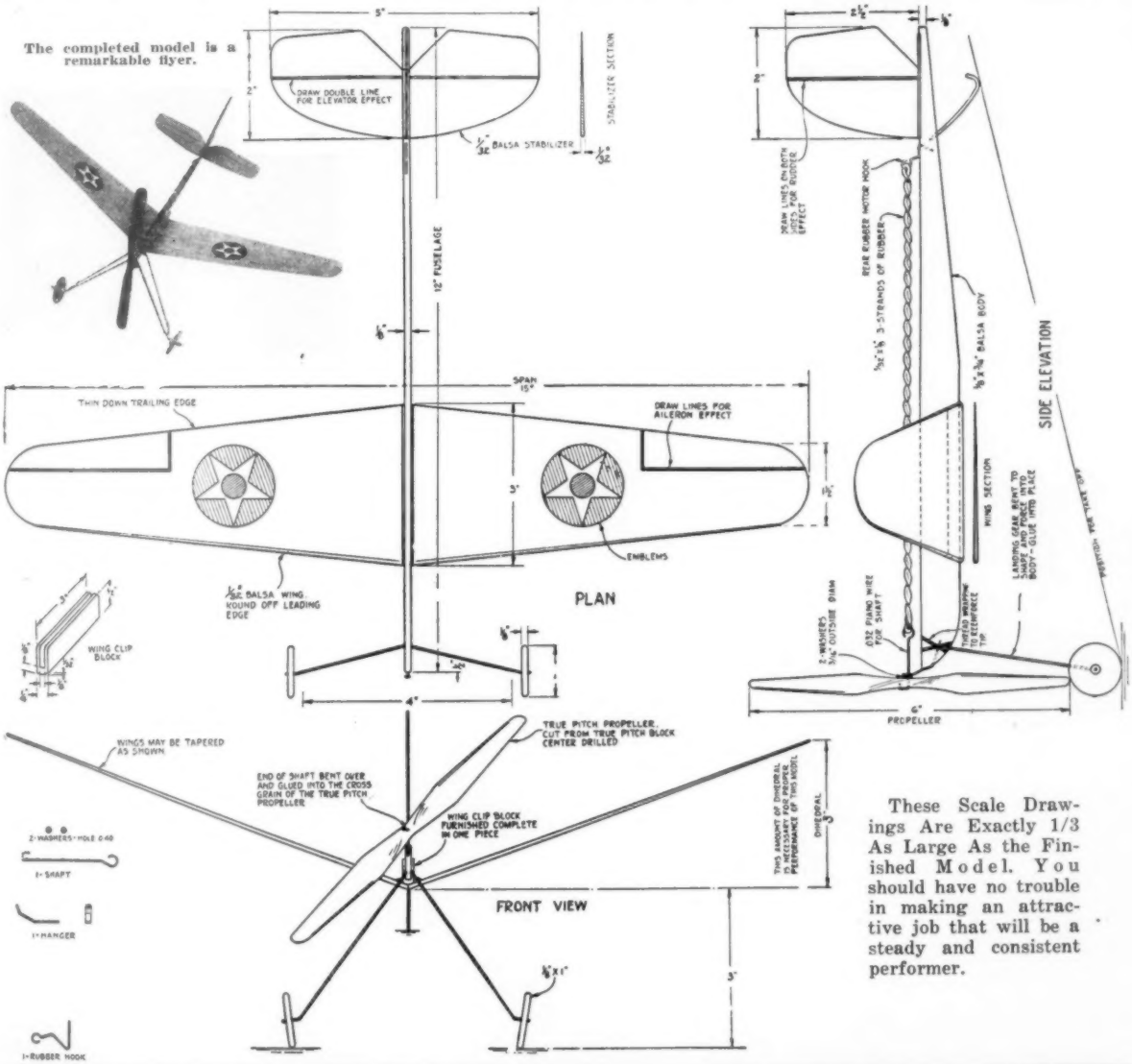
Duration flights, up to 45 seconds, have been secured. For the amount of duration obtained, it may be considered that a model with such performance and simplicity is really exceptional—it climbs to a height of 75 to 150 ft. The distance covered is equivalent to two or three city blocks.

Abbreviated Building Instructions

The list of materials may be taken directly from the drawing:

1—Body
2—Landing Gear
3—Skid
4—Rudder
5—Stabilizer
6—Wing Block
7—Wing
8—Shaft
9—Rear Hook
10—Propeller
11—Assemble Wings (Note large Dihedral—this is very necessary).
12—Motor
13—Emblems

The completed model is a remarkable flyer.



These Scale Drawings Are Exactly 1/3 As Large As the Finished Model. You should have no trouble in making an attractive job that will be a steady and consistent performer.

MODEL DEPARTMENT

How to Build
THE BOEING P12 B

by JOSEPH S. OTT

The Model Editor of POPULAR AVIATION has been favored with thousands of requests and questions from enthusiastic readers. Unfortunately it has been impossible for Mr. Ott to give detailed individual answers, but all questions of general interest to model builders will continue to be answered in the columns of POPULAR AVIATION.

UP TO the present time, we have offered various models of foreign war planes. This month we are coming back to our own country and are presenting a Boeing P12 B. This is the fastest American army pursuit plane now in active service. A few other designs have appeared, but so far, the army has not accepted these, and the Boeing P12 B stands as the foremost and fastest fighter of the American air service.

All of the various models we have described so far were built with one or two of the wings adjustable. Balancing of a model with a wing that has clips and allows it movement back and forth over the center of pressure is simple. This month's model, however, must be adjusted for flight by adding a small weight to the nose.

This is not very difficult as long as the angle of incidence is approximately correct. The specifications for this is ⅛ of an inch rise at nose of the entering edge for the 30" model.

The complete model should not weigh over 2 ounces for a 30" wing span, and 1 to 1¼ ounce for 24" wing span. Making a model lighter than this weakens the structure and prevents its use, except on a very calm day.

The body structure has been simplified by building a square frame to the inside dimensions permissible and adding the round sections onto the fuselage. The accompanying list is arranged for a 30" model. For a 24" model the sizes may be the same, but should be sanded down on all sides to eliminate a small portion of the weight.

Materials

No. 1. Body — 10 pcs.—3/32"x3/32"x 30"—Balsa.
No. 2. Landing gear—2 pcs.—1/16"x ¼"x15"—Bamboo.
No. 3. Tail—2 pcs.—1/16"x¼"x15"—Bamboo.
No. 4. Wheels—2-2" diam. Celluloid.
No. 5. Struts—2 pcs.—1/16"x¼"x15" —Bamboo.
No. 6. Fittings, piano wire — diam. .029.
No. 7. Propeller—⅝"x1"x11"—Balsa.
No. 8. Motor stick—3/16"x5/16"x15" long—Hard Balsa.
No. 9. Rubber motor—10 ft.—⅛" 30 gauge.
No. 10. Spars—3 pcs.—⅛"x3/16"x30" Balsa.
No. 11. Trailing edge—3 pcs.—1/16"x ¼"x30"—Balsa.
No. 12. Entering edge—2 pcs.—⅛"x ⅛"—Balsa.
No. 13. Tissue—3 sheets — 18"x24"—Super Fine.
No. 14. Rib stock—Balsa 1/32" or 1/16" sheet stock, approx. 2x 30".
No. 15. Glossy lacquer, black — for struts.
No. 16. Cement—½ oz. unit.
No. 17. Banana liquid—Small can.
No. 18. Glossy lacquer, aluminum—red for propeller.
No. 19. Washers—3 ea.
No. 20. Allied war emblems.

Abbreviated Building Instructions

No. 1. Body.
No. 2. Cowling—Sides.
No. 3. Nose Block.
No. 4. Landing Gear.
No. 5. Tail Skid.
No. 6. Dummy Motor.
No. 7. Stabilizer.
No. 8. Rudder.
No. 9. Upper Wing—Ribs.
No. 10. Lower Wing—Ribs.
No. 11. "N" Struts.
No. 12. Motor Stick.
No. 13. Propeller.
No. 14. Clips—Motor Stick.
No. 15. Thrust Bearing—Shaft.
No. 16. Covering.
No. 17. Decorating.
No. 18. Flying.

This attractive model, built by Orland Jack of Waukegan, Illinois, is a non-flying scale model modified from the flying scale plans shown here. The Boeing P12 B is also put out as a single-place sport plane, shown above, known as the Boeing 100.

Body—No. 1

THE reduced drawings presented in magazine form in most cases necessitate a redrawing by the model builder to a full size scale. When doing this, it is not necessary to make every detail. For example, when building the body, the general outline dimensions of the side view only of the square sections is necessary. The longitudinal members constitute a certain amount of space. The upright and across pieces will fit in after the long members are in position. This would be the ideal procedure in view for this model.

When one side is built, a piece of wax paper is placed over and the second side is built on top. After the two sides are dry, they may be separated. Add such bracing as is shown at the point where struts meet the body. The top side is a straight line, and the cross parts should be cemented here first. The whole unit may be worked on a smooth table, pinning down the parts as they are cemented in place. Be sure that the side members are held in a true upright position, so that the body will be square after completely assembled.

The top cowling should equal the width of the body, and the height may be secured by multiplying the scale of a small drawing times the proper amount of enlargement that is desired. The lower cowling is semi-circular in section and may be added the same as the top. Referring to the top view and front view, the sides of the body are flat after the second station of the body. The nose being round, the body must be flared to fit until the flat section is reached.

Cowling-Sides—No. 2

The body formers having been cemented in position longitudinally, stringers may be added to maintain the semi-circular sections of the top and the lower sides of the fuselage. Three is the minimum amount to be used, and four and five will do better. These stringers reach from the nose to cockpit. From the cockpit back, three stringers will be sufficient.

Nose-Block—No. 3

The nose block may be built up or carved from a solid piece. The rear part may be hollowed out. Care should be taken to carve only that part away so that enough material is remaining to cement against the first section of the fuselage. The oblong hole in the very nose should be cut out large

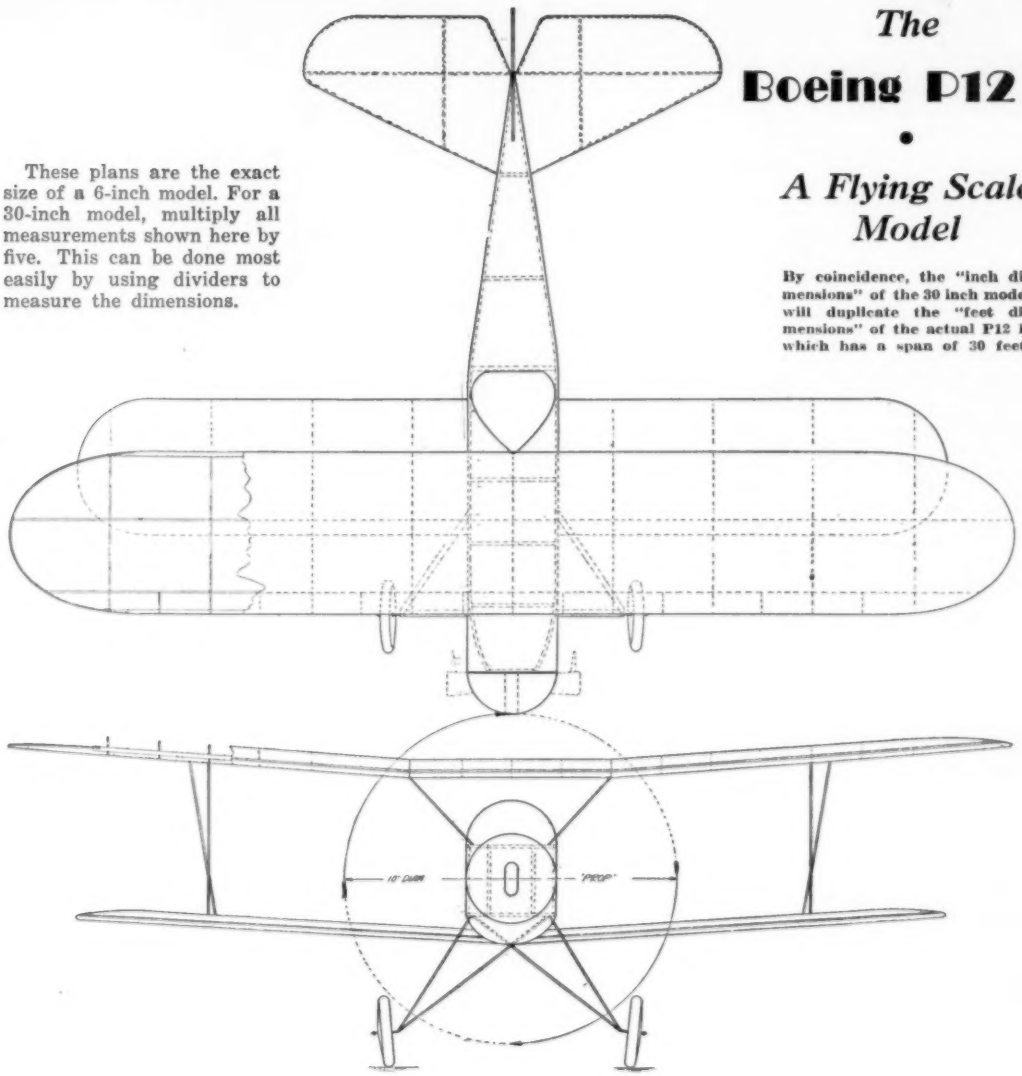
XUM

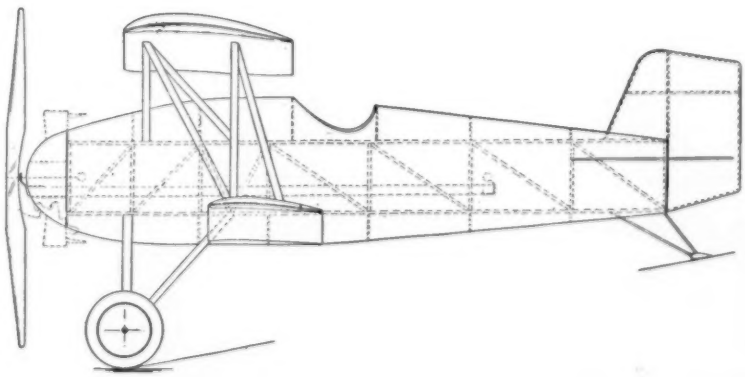
The Boeing P12 B

A Flying Scale Model

These plans are the exact size of a 6-inch model. For a 30-inch model, multiply all measurements shown here by five. This can be done most easily by using dividers to measure the dimensions.

By coincidence, the "inch dimensions" of the 30 inch model will duplicate the "feet dimensions" of the actual P12 B which has a span of 30 feet.





enough to allow the entering of the motor stick above the clip.

Do not force the motor stick into the clip and then slide the whole unit back into position. In some cases this breaks the wing clip out of position. One or two coats of thick dope will add to the appearance and strengthen the hollow nose block. The dummy motor will be built around this nose block, as explained in No. 6.

Landing Gear—No. 4

The photograph and the drawing will explain the assembly of the landing gear. The materials to be used are bamboo and piano wire for the axles. Where connections are made at the body, sufficient blocks should be added so that the bamboo may be forced into the block and then cemented down.

Landing gears take all the shock and break off at their points of connection too easy, and placing the end of the bamboo parts onto the blocks helps to secure and strengthen at the point which would be weakest ordinarily. Do not rely upon the strength of the cement too much and expect a butt-joint to hold, especially at a place where all the shock load is carried.

Tail Skid—No. 5

The lower part of the tail skid may be a piece of hard Balsa. The tail skid struts themselves are bamboo. Force the rear piece into the rudder post and cement securely. No shock absorbing effect is allowed for in this tail skid, with the exception of the flexibility of the bamboo parts themselves.

Dummy Motor—No. 6

The side and top view plans show an added outline of the general appearances of a cylinder with exhaust pipe. Nine corks of the approximate size that look best should be prepared to this shape. These may be spaced equally around the nose block and cemented in place. Small corks will answer the purpose very well.

Rocker arm casings should be added to the top of each cylinder—two per cylinder. Push rods, one for each rocker arm casing, may be made of bamboo. All these parts should be painted black. The nose itself should be aluminum. This will make a very neat job and look well.

Stabilizer—No. 7

The outline of the stabilizer should be drawn to full scale and built up either from bamboo or Balsa. When using bamboo, the correct shape may be bent by heating and then thinned down, so that excessive weight is eliminated. The stabilizer is covered only on one side.

The Boeing P12 B in Flight.

When using balsa, the part may be 1/16"x3/16" and cemented together in sections, and then the outline cut to the proper form. In this case, ribs may be added and surface may be covered on both sides. This will make a very neat job, but not quite as durable as bamboo. The bamboo stabilizers will withstand a lot of shocks and not break. Balsa splits easily, and if the model falls to one side and lands on the tail, it would mean some repairs.

Rudder—No. 8

The rudder may be built with either of the methods described above. It is a good policy when making a bamboo stabilizer to carry out this method of construction in the rudder. If balsa is used for one, it should also be used for the other.

Wing—No. 9

The top wing is built up, using two main spars and the leading and trailing edges to help build the complete structure. The full size ribs for the 30" and 24" models are illustrated. They will have to be reduced when building models of any smaller sizes, or in some cases, they should be increased.

The ribs must all be cut out first and then the whole lot should be held together and sanded down so that all are of equal size. The complete wing, including all the ribs and all the spars, should be assembled on a flat surface. The wing tips are of bamboo and no difficulty should be had in bending this piece to the desired shape. Do not force the bamboo in place until the exact contour is made previous to cementing against the other parts. The wing tip might help to warp the whole wing and it is best to bend to the desired shape before applying.

Small nose ribs are added from the front spar to the leading edge. This helps to maintain the top camber of the rib. After the whole wing is dry, the spars and the leading and trailing edges should be cut part way and folded upward so that the correct amount of dihedral may be put in. It is not necessary to cut through completely—just partly, and the rest cracked and then cemented, will answer the purpose.

Wing—Lower—No. 10

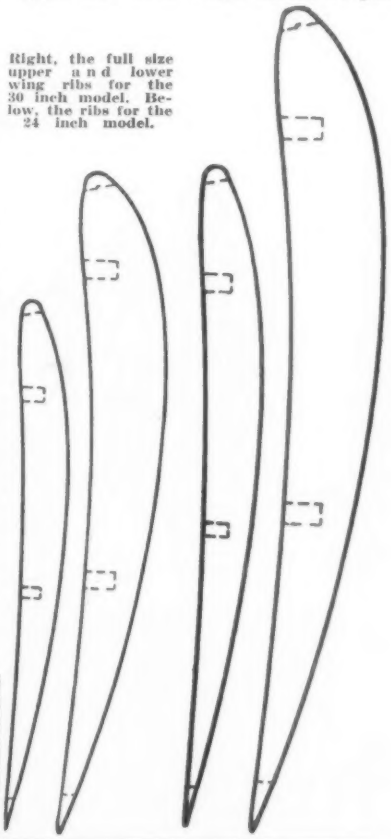
The same procedure of assembling the structure is employed on the lower wing as that of the top. The ribs are cut first and the remaining parts are added, then, putting in the correct amount of dihedral, the whole structure is allowed to dry. On the smaller models the wing tips may be made from balsa and holes cut in helping to eliminate some of the weight.

Struts—No. 11

The center section struts are cemented in position by fitting the top wing in the proper location. Do not cement the wing in position until after it is covered but the preliminary fitting should be made at the time the center section struts are cemented in their correct location. At this time, be sure and check up the amount of incidence that is necessary.

The wing struts separating the upper and lower wings should be put

Right, the full size upper and lower wing ribs for the 30 inch model. Below, the ribs for the 24 inch model.



Profile Fuselage Models, each only 85c

[3 for $2.45]

Everyone a beauty; each in perfect proportion to the others. Special price good only until Aug. 31, 1931—after that it again becomes $1.10 each.

Primary Glider, and Advanced Soarer (combination kit) Kit FL-101; Great Lakes Trainer, Kit FL-102; Fleetster High Wing Monoplane, Kit FL-103; Boeing Fighter, Kit FL-104; Eaglerock Bullet, Kit FL105; Curtiss Hawk, (pictured here)

Kit FL-106; Travel Air Mystery Ship, Kit FL-107; Boeing Mail Plane, Kit FL-108; Curtiss Robin, Kit FL-109; Vought Corsair, Kit FL-110; Lockheed Sirius, Kit FL-111; Curtiss Falcon, Kit FL-112.

Spans 10 to 18¾ in.—all to ⅜ in. scale

FREE Special Summer Lists. Send 2c to cover postage.

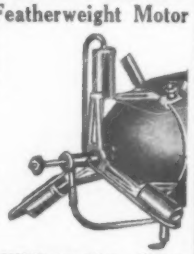
Complete Cleveland Notebook-Catalog mailed upon receipt of 25c (No Free Copies).

Cleveland Model & Supply Co.
Modern Aircraft Engineers Since 1919
1866PA West 57 St., Cleveland, O.

LOOK -- FELLOWS -- LOOK!
Model Aviator Featherweight Motor

New rock bottom prices — All parts bent formed—timed and drilled. Knock-down 3-cyl. Kit, postpaid only.

99c



Air Tank Kit 3"x3"x30" or Smaller, Postpaid . . $1.75

Vega—Mystery—SE-5—Triplane, 4 for 25c., postpaid.

Model Aviator Products 3335 Eastwood Ave. Chicago

BUILD BETTER MODELS with TUBING

Be the first in your town to fly a model built of tubing. Wyoming Model Aircraft Tubing is by far the best material for flying, scale or experimental models. Light and strong. Easier to use than Balsa.
Only one size—⅛ inch diameter, 20 inch lengths. 35 lengths, with instructions, postpaid for $1.00. No catalogues or samples, order direct from this Add.
Stamps and Foreign Coins Not Accepted

Wyoming Model Works Box 764 Rawlings, Wyoming

in place and cut to size only at the time when both wings are in place. It is best to fit the struts and cement them in place at one time, at all times taking care to maintain the angle of incidence throughout the wing.

Motor Stick—No. 12

The motor stick may be long or short, as desired, but in most cases a trifle shorter stick will help to balance a model. The size may be 3/16"x⅜" balsa wood. In case pine is used, 3/16" x¼" will be sufficient. The thrust bearing is mounted at the front end, and the rear hook in its proper location. This unit is held in place by the motor stick clip that is cemented in position on the inside of the nose block.

Propeller—No. 13

The diameter of the propeller is 10" for the 30" model, and the amount of pitch should be medium. In some cases a low pitched propeller works very well on a scale model; in fact, a low pitched propeller always makes a model fly a little steadier, but probably not quite as long. A good policy would be to use a low pitched propeller on the trial flights and later, one of a little higher pitch as the trials continue. Hard balsa should be used for the propeller, and after completely carved, two or three coats of dope will help to strengthen and smoothen the surface.

Clips—Motor Stick—No. 14

Piano wire .029 is suitable for the clips that are used in the nose block and towards the rear of the motor stick. The one at the rear of the motor stick is held in place right beneath the rear end of the cockpit, so that the fingers may be inserted through the cockpit to push the motor stick in place.

Bearing—No. 15

The thrust bearing may be purchased as a standard unit and a fairly strong top should be employed. It may also be made up from flat strip steel, drilling a hole to fit approximately 1/32 of an inch shaft. It is always advisable to allow a slight increase in diameter over the shaft for the hole in the bearing.

Covering—No. 16

Superfine is a very nice grade of tissue, and answers the purpose admirably in covering the complete model. A lot of model stores now carry Hakone, and this tissue has the quality of drawing out all wrinkles when sprinkled with water, still it is not quite as strong as superfine; the weight of either of these two being approximately the same.

When completely covered, if the model is strong enough, some parts may be doped—the body for one, and possibly the wings. Caution must be used by the model builder, and he must judge for himself whether the structure will with stand the pulling strain after being doped. It is not advisable to dope the tail parts—just sprinkle with water so that they are pulled smooth.

Decorate—No. 17

The army colors of planes are usually khaki wings and khaki body, with a red, white and blue striped rudder. The propeller is of aluminum, the wings having stars on their tips or on top of the upper wing and beneath the lower wing. The landing gear and struts should all be painted black. The best material to use in painting is lacquer; this dries quickly and gives very beautiful colors.

Flying—No. 18

Because of the possibilities of damage to a scale model, it is advisable to employ dihedral. Inherent stability is desired of all models, because they do not have the ability to correct their path of flight. The utmost caution must be employed in trying out a model the first time; the approximate center of gravity must be located and the necessary weight added to the nose to bring about the meeting point of the center of gravity and the center of pressure.

After this is secured, it may be advisable to glide the model minus the motor stick, then adding the motor stick and gliding again and making adjustments for flight. When the model is ready to be tried, it is advisable to have a boy friend help in adjusting the proper balance, one boy launching it and the other boy catching it—first being very close together and gradually widening the distance until the model glides normally.

Subscribe to Popular Aviation

What Other Co. Gives You All This!

50 Rubbers free with every order of $1.00 or over. All Goods sent insured by us. Postage paid in U. S. 10% Discount on orders of $5.00 or over. 1-hour service. Highest quality. Lowest prices.

Balsa ¼ sq. x 40 ins. long, 8 for 5c. Dope or Acetone. ¼ x 2 x 40 ins. long, each 5c, 4 oz. 10c, 8 oz. 20c. Two-foot Cabin Plane Kit 90c. Ambroid 4 oz. 30c. Wire, No. 4, 6, 8, 10, 10 ft. 3c. 10 Baby R. O. G. Kits in one, $1.00. Send three 1c stamps for Price List. Dealers and Clubs write for special prices.

WOBURN MODEL AIRPLANE SHOP

19 Belmont Street :: Woburn Mass.

HAWK SOARING GLIDER

This 24-inch glider can be assembled in 5 minutes. All parts cut to size and shape. Cement and insignias and instructions are furnished. There are 2 complete sets for 2 gliders in this kit. Has recorded flight of one minute. PRICE FOR KIT, $0.75, postpaid.

DORNIER "DO-X"

7 full-size sheets of blue prints to build above "DO-X." All wood model, exact scale.....$1.50

"THE ENTERPRISE"

6 full-size sheets of blue prints to build the WORLD'S FASTEST sail boat.....$1.50

BLUE PRINTS

SCALE NON-FLYING

24-INCH

Sikorsky 10 P1	$0.25
Ford Tri-Motor	.40
Stinson Detroiter	.40

SPECIAL PRINTS

10-INCH TO 15-INCH

Curtiss Hawk P3A and Travel Air	$0.25
Curtiss Hawk P6 and Boeing Pursuit	.25
Boeing 80A and Curtiss Condor	.25
Sikorsky S.38 and Boeing 204	.25
Supermarine and Mercury Racers	.25
Wallace Touro Plane and Inland Sport	.25
Keystone Bomber and Hall Aluminum; Patrol	.25

SCALE DRAWINGS OF TROPHY WINNERS

Curtiss R.3.C.2	$0.40
Curtiss R.3.C.1	.40

SCALE WORLD WAR PRINTS

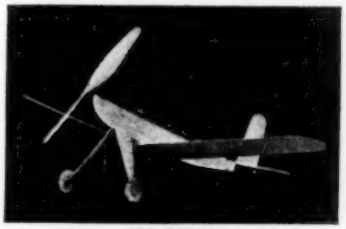
From Official Drawings

BRISTOL SCOUT	$0.25
FOKKER D. 7	.25
SPAD 220	.25
S.E.5.A.	.25
FOKKER TRIPLANE	.25
PFALZ (D 12)	.25
CURTISS JN.4	.25
ITALIAN ANSALDO (S. V. A.)	.25
SOPWITH CAMEL	.25
SOPWITH TRIPLANE	.25

FLYING MODELS SCALE—24 in.

Curtiss Hawk P6	$0.40
Curtiss Hawk P3A	.40
S.E.5.A. (1917)	.40
Vought Corsair	.40
Travel Air Mystery Ship	.40
Lockheed Sirius	.25
Hawkers Fury	.40

GAMECOCK R. O. G.



ALL BALSA

Kit set contains everything cut out to size, all balsa. Easy to construct and fly. Has repeatedly gained altitudes of over 100 feet, with dead stick landings. PRICE FOR KIT, $0.75, postpaid.

THE S. E. 5 "A" 24-INCH WINGSPAN

The construction set for this plane contains all the necessary parts and material; ribs cut, formers made, celluloid wheels, full size layout exact scale blue prints and instructions. All wood parts are of feather weight BALSA. The S. E. 5 "A" is easy to construct and is by far the best flying scale model that can be built, holding the present record of 48 seconds. The S. E. 5 "A" has a gliding angle of 12 to 1, a ceiling of 60 feet—nothing like it has yet been produced in kit sets.

The S. E. 5 "A" is the plane that won for the Royal Flying Corps the supremacy of the air in the World War.

PRICE FOR KIT $3.00, postpaid

HAWK MODEL AEROPLANES

Free with each order of $1.00, 20 pictures of old war planes

4944 IRVING PARK BLVD. DEPT. P2 CHICAGO, ILLINOIS, U. S. A.

WOMEN'S ACTIVITIES

EDITED BY LADY MARY HEATH

June 8, 1931.

MISS RUTH NICHOLS is all ready for her Atlantic flight, and is only awaiting a good weather report to set off. Of the four women who are attempting this flight, it looks as if she stood the best of what we must consider remote chances. Miss Nichols' rivals in this feat are Mrs. Keith Miller, who is said to have a machine waiting for her near New York; Miss Laura Ingalls, who has a Lockheed Vega in Californa, and Mrs. Geraldine Grey Loffredo of Buffalo.

Lady Mary Heath.

* * *

Mrs. G. P. Putnam (Miss Amelia Earhart), who has undertaken a six-weeks tour lecturing for the National Exchange clubs has started across the continent in her Autogiro. She has had the honor of being elected as vice-president of the National Aeronautic Association. Miss Earhart was also guest at the dinner given by the transatlantic flyers to Doctor Kimball, chief of the weather intelligence. Mrs. Walter Camp (Miss Ruth Elder) was also present. Among other events Miss Earhart was principal speaker at the Kiwanis luncheon at Washington on May 7th.

* * *

Mrs. Lindbergh took her flying license on May 29th at the Aviation Country Club at Hicksville, Long Island. She is going to fly with Col. Lindbergh to China and Japan in his Lockheed Sirius, which is now being tested at North Beach. Could a finer president be found for the "99 Club" than Mrs. Lindbergh, if she would accept it?

* * *

Mlle. Lena Bernstein in the beginning of June attempted to break the world's record for light machines in a flight from Paris to Cairo. It is understood that she did not succeed, but we look forward to her early success.

* * *

Mrs. Floyd Bennett, who was one of the guests of honor at the Hotel Astor at the dance of the National Association of Pilots and Aero-Craftsmen, towards the end of May had the privilege of opening the fine new airport named for her famous husband.

* * *

Miss Frankie Renner is due to make her second attempt on the altitude flight for women. She belongs to the Robbins Flying Service of Akron.

* * *

Mrs. Florence Klingensmith of Minneapolis is to attempt a new looping record for both men and women on the week of June 20th.

The duration flight of Miss Bobbie Trout and Miss Edna May Cooper of 123 hours, carried out in January, as well as Miss Nichols' speed record of 210.636 miles an hour, have been passed by the Federation Aeronautique Internationale.

* * *

The Betsy Ross Corps, founded by Mrs. Opal Kunz early in May, has been presented with a flying field for its use in Florida.

* * *

Mrs. Clark D. Stearns of Miami, Fla., has been made president of the Women's National Aeronautical Association. Other officers elected were Mrs. George Shaw Greene, first vice-president; Mrs. Ulysses Grant Macqueen (founder of the International Women's Aeronautical Assn.), second vice-president; Mrs. Don Peabody, secretary, and Mrs. Blanche Reed, the treasurer. The founder of the association, Mrs. Orra Heald Blackmore, was made a director along with Mrs. J. Don Alexander, Mrs. Harry J. Fowler, Mrs. A. G. Spear and Miss Mary Dowd.

* * *

Mrs. Phoebe Fairgrave Omlie and Mrs. Florence Lowe Barnes, two of our best known women pilots, have had recent attacks of appendicitis and are both making very satisfactory progress.

* * *

Mrs. Griffeth Brewer, it is not generally known, was the first woman to cross the English Channel by air. She did so in a balloon in 1906, preceding that splendid American, Miss Quimby's, successful attempt by five years.

* * *

On May 10th Miss Winifred Spooner of England led the 10 German glider visitors from Lympe Aerodrome to London in Mr. Lindsay Everard's Puss-Moth. She is employed by Mr. Lindsay Everard, M. P., as his private pilot.

* * *

Miss Priscilla A. Traux has accepted a job as pilot with the Halterhof Flying Service, Inc., of Milwaukee, Wis.

* * *

Mrs. Walter Camp (Miss Ruth Elder), who has just made a fine talking film on gliding, which is being shown throughout the world, wore an interesting new garment by Altman and Co., Inc., on her recent visit to lunch with Mrs. Herbert Hoover and Mrs. Opal Kunz. It is of jade green cordite, with white kid facings. Mlle. Maryse Hilz of Paris has also designed a "Jupe Pantalon" or divided skirt of tweed for flying. Mrs. Frances Harrel tells me she is getting one of these. Incidentally she has a new woman pupil, an actress, Miss Annie Laurie Jacques, who promises to be a very good pilot.

Mrs. Holderman, wife of the manager of the D. W. Airport at Leroy, N. Y., has taken her glider license after only one week's instruction under Mr. Hawley Bowlus.

* * *

Miss Ruth Barron of Nyack, N. Y., an aviatrix, has joined Mr. Thomas Ash in Tokyo to accompany him on his transpacific flight.

* * *

Miss Peggy Bramhull, a graduate nurse of Long Island Hospital, soloed in the record time of three hours' instruction at the New York City Airport at the end of May.

* * *

Seventeen Egyptian women visited on May 1st the Heston Airport in London and were given flights by Imperial Airways to encourage the use of the flying lines in Egypt.

* * *

At the All Women Meet at Baltimore early in May Miss Thelma Elcott took the Maryland altitude record with a flight of 16,800 feet. It was 12,500 before that, and was held by a man.

* * *

Miss Edna Lessher, who recently learned to fly for pleasure from Mr. William C. Patterson, has now married him at Homesdale, Pa., and has gone on a flying honeymoon with him in a machine given him for the occasion by his firm.

* * *

Six members of one family, Mr. and Mrs. Kleis, with their two sons and two daughters are all learning to fly at the Ludington Airport at Philadelphia.

* * *

Soviet Russia, where Miss Fay Gillis now is, has a fine list of women pilots. The Red Army is the only one which enlists them in an aviation capacity. I hear the best is Madam Nahezhda Vladimiriva Sumarokova. She is a widow with one son. Many women are learning to fly at the schools of Leningrad and Tula. At the former place is a glider school under the direction of Madame Obraztzova.

* * *

Mrs. Earl T. Vance of Great Falls, Mont., was recently presented with a Waco plane by her father. This replaces Mrs. Vance's former plane which was destroyed in a hangar fire at the National Parks Airway field.

* * *

There are now 455 women pilots in the United States, more than in any three other countries in the world. Of these there are 50 limited commercial pilots and 35 transport pilots. The rest are private pilots. There are five women mechanics.

Readers!

Why not sit down now and write us about that interesting flying experience you had the other day!

The editor is always interested in receiving yarns, photos, sketches, descriptions of flights or planes—in fact, anything connected with aviation.

The Ruse That Saved Haight

(*Continued from page* 34)

Haight was also in this battle, and two Fokkers got on his tail soon after Germer's enforced flight. As the enemy tracer bullets streamed by Haight's head he began a series of quick maneuvers to shake his assailants off. He roared about the sky in dizzy orbits, but the foe matched every move he made and continued to throw four blazing streams of bullets at him.

To have two Fokkers above and in rear was usually a defenseless position for a single-seater Spad—a Fokker maneuvered better than a Spad. But a Spad could dive faster than a Fokker, and Haight tried this ruse to escape.

The first time Haight came out of his dive and sped toward home, he realized that his German adversaries were far too experienced to be eluded thus. They had dived almost as fast as he had and their bullets were whipping dangerously near again.

If he did not dive continually, they would probably shoot him down. If he dropped almost to the ground and came out, he could hardly hope to make our lines without being destroyed. In other words, he had either to go down precipitately or be shot down.

Haight decided that there was only one thing to do—land in Germany. He pulled his Spad out of a steep dive a hundred feet up; he side-slipped into the nearest field and made a good landing. But before he reached the ground the Germans were blazing away at his back. When the American's plane stopped rolling, they were still not satisfied and continued to swoop down and fire at it, apparently believing that the only harmless enemy aviator was a dead one.

One may think this a particularly cruel thing to do, but at the same time it should be remembered that neither side practiced sportsmanship to any great extent at the time the Americans were doing the bulk of their air fighting.

Finally one of the Fokker pilots made a sweeping dive for the Spad and after firing a short burst from a close range saw Haight sprawl limply out across the edge of the cockpit, his arms and head drooping. Convinced that the American was dead, he and the other German pulled up into the air and flew away.

When the hawk-like outline of the Fokkers faded in the distance, Haight came to life as suddenly as he had apparently died. He had very cleverly played possum on the Germans and now that they were gone he opened the throttle of his motor, went roaring into the air and sailed away home.

In all the annals of the war it would be hard to find a better example of coolness and headwork than Haight's or, for that matter, an odder escape.

In later combats Haight evened up with the enemy for the rough treatment they attempted to mete out to him. He gained five aerial victories that were confirmed.

Henry Hunt and His Planes

(*Continued from page* 29)

from the Old Jamestown exposition grounds and finally sold it, the new owner dismounting the engine and using it in a power boat.

In 1914 Hunt enlisted in the Aviation Section of the Signal Corps, U. S. A. where he had an opportunity to work with many planes and did some designing work, which he continued for various companies after being discharged from the service in 1920. During all this time his mind was being directed more and more toward the solution of the problem of building a fool proof plane.

The plane he is working toward is one that is suitable for the use of the average man or woman and can be flown after a short period of instruction. It must have inherent stability but this stability must not be carried to the point where the necessary maneuverability is interfered with. It must be a plane that will leave the ground quickly and that has a good rate of climb as well as a good gliding angle. It must also be a plane that lands at a slow speed.

With these ideas in mind, Mr. Hunt built an experimental plane which he tested at Old Orchard Beach, Me., late in 1929. This is the plane that he claims to be the slowest landing plane ever built. It had a power loading of more than 50 pounds per horse power, was very stable and could be flown by anyone after limited instruction.

The average landing speed in still air during these experiments was twenty miles an hour but a number of landings in still air were made with a speed of less than 12 miles. In a head wind the plane could be landed in a remarkably short distance. The power plant used in this plane was an experimental engine developing about 20 horse power and weighing 318 pounds.

Following this plane and profiting by the information gathered from the experiments made with it another plane was constructed. This plane, the three place Hunt Crusader does not follow closely present airplane practice. It is a high wing monoplane with a span of 45 feet.

In tests this plane takes off in an average distance of about 180 feet and starts at once into a climb of one in seven or close to 800 feet per minute. It has reached an altitude of 65 feet in 660 feet from a standing start. The gliding angle is 20 to one and the minimum air speed is around 22 miles per hour.

The landing gear is fitted with air wheels and special oleo struts with a maximum stroke of twenty inches. The tread is nine feet and landings can be made with a high vertical velocity. This means that an unskilled pilot can land the ship without damage and overcomes much of the long period of training required in making landings. The take off speed is 32 miles per hour and the average landing run about 80 feet.

The plane can be brought to a stop in a much shorter distance, however, by applying the brakes with which it is equipped. The maximum speed with the present engine is 90 miles an hour and the fuel consumption by test is four and one quarter gallons per hour. This ship is being given a thorough series of tests to ascertain what if any improvements are possible when building a new one. Its lateral control is nearly automatic, it is very difficult to spin, but maneuvers with ease and will almost fly alone.

Classified Advertisements

BOY, 19, wishes employment with some reliable aircraft firm to obtain mechanic or pilots instruction. Wages no object. Will go anywhere. Write Gerhard Christianson, Waterford, Wis. Box 38c.

NOW—Corben Baby Ace Semi Built Kits including fuselage, landing gear and tail group factory welded. Insures you of success in building your sportplane. 10c brings folder. Corben Sportplane Co. Peru, Ind.

GLIDER MOTORS. That really keep you up. Lightest of its kind. Sold complete or castings in rough. Also motor Glider Mounts to any particular Glider. Send Dime for Photos. Glider Motors, P. O. Box 1585, Cincinnati, Ohio.

BE SURE that the motor you purchase for your light plane will fly it. HEATH B-4 and HEATH HENDERSON motors are guaranteed to fly and 7 years of constant performance prove it. For economy and reliability these motors cannot be equaled. Send 10c for large illustrated booklet. Heath Aircraft Corp., Dept. KR-8, Niles, Michigan.

MODEL MOTORS, air and steam type, supplies models. Illustrated catalogue, 10c. Minature Aircraft Corps, 83 Low Terrace, New Brighton, N. Y.

FOR SALE—Modern Aviation Engines by Major Victor W. Page. 2 volumes. Brand new. A complete authentic work of reference and instruction for home or school use. Price, $9.00. Address Box 67, care of Popular Aviation, 608 S. Dearborn St., Chicago, Ill.

New Home of Heath
Greater Production
Greater Value!

MAY FIRST was moving day for Heath too. Settled in its new large plant in Niles, Michigan, Heath now has greater production space which means greater values with the same fine quality, performance and reliability. Heath guarantees to continue its leadership in the light plane field—leadership based on 22 years' experience, leadership which enables you to fly Heath planes for 1 cent per mile with a surprisingly low first cost!

HEATH AIRCRAFT CORP.
Dept. R-8 - Niles, Michigan

Amateur's Lightplane

(*Continued from page* 10)

29½" and the length is 15'7". The landing speed about thirty-five miles an hour, just about what Terle had estimated on paper. The cruising speed is 70 miles an hour, and at 100 miles an hour it will carry a weight of 1,160 pounds.

Terle powered his ship with a nine cylinder Salmson motor using only 2½ gallons of gasoline and 25 drams of oil an hour. He couldn't afford to buy the motor himself but he had a world of confidence in his plane, so when it was about finished, he persuaded a friend, Steve Reich to buy the motor for him.

He had never flown a ship of course, and when he arrived at Roosevelt Field in an automobile, towing the plane behind him, he timidly taxied it about a bit, causing the veteran pilots and many spectators to laugh. There was just one of them that didn't and that was Bert Acosta, the happy go lucky chap who was co-pilot on Rear Admiral Byrd's transatlantic flight.

Acosta, because of an escapade had not been in the air for six months. His license to fly was suspended, but that suspension did not apply to unlicensed home-made planes. He went over and introduced himself and asked to taxi the plane about a bit.

As Terle's plane is a single place job, he got out and the veteran Acosta took the controls. Without helmet or goggles, Acosta climbed in and after a short run, much to Terle's delight, took off.

He looped her and dived her, did wingovers and spirals, and just for good measure landed at the Aviation Country Club at Hicksville and "as good as sold two planes."

"I like her better than any ship I ever flew" he told the delighted Terle when he returned. And as for Terle . . . one-half of his dream has been realized. He has built a ship that flies and soon, if the gods be kind, he hopes to fly her himself.

The Bearded Lady

(*Continued from page* 21)

so she just threw up her hands and screamed for help!

The plane took a serpentine course down the field, every second of which seemed apparently doomed to end in a crash. Then it left the ground, climbed a little and started to turn in the air. The crowd went wild—the thrill seekers would soon witness a tragedy.

Women spectators fainted and men ran in every direction. But help was out of the question. The Lord was the only one who could help her now. Nothing could be done but just wait and pray for the best.

The plane was a very stable craft and if left alone it might crash without injury to her. But would she let it alone. Around the field the plane flew; spectators only saw arms waving out of the cockpit. Finally after a short period — it seemed like an age — the plane headed back to the field and gradually lost altitude until it landed and stopped in the middle of the field.

The pilot and several airport assistants rushed out to the ship. She had evidently lost consciousness and her head hung forward so that no one could see her face. She had fainted, either from fright in the air or from the joy of finding herself safe on the ground again.

The pilot taxied the ship up to the hangar. Some one brought a glass of water and she was revived. The pilot helped her out of the cockpit and then aided her in walking to the hangar office.

A boy standing near the door as she and the pilot walked past yelled in a very loud voice, "That lady looks to me like she needs a shave."

Evening papers carried a picture of her. There was no name, but the following paragraph was under the picture:

"This is *not* a picture of the 'World's Oldest Woman Flying Student' but of one of the crack pilots of the Glenn & Wilbur Flying Service, about to take off to give the crowd a demonstration of 'her' first flying lesson."

Tales Around the Hangar

(*Continued from page* 30)

and then to make a test. The pilot of the cabin plane loaded eight passengers into his plane, and took off. Upon his landing the other pilot coaxed eight of the employes and students on the field, into his plane, and taxied down to the far end of the field in order to take off into the wind.

There they encountered two more of the field employes who were engaged in repairing a boundary light. By some means these two men were persuaded to get into the ship with the nine who were already there. The pilot opened the gun and headed the ship down the open field.

The ship lumbered along very slowly and was one third the way down the long field before the tail would lift from the ground. Very slowly it gathered speed and just before reaching the end of the field, it lifted enough to clear the fence which surrounded the field.

Climbing very cautiously the pilot made a wide circle, and came back for a very fast landing. Upon taxiing to the hangers and unloading, the ten passengers, agreed that should the pilot care to enter another such contest, the cargo would have to be sandbags. Certainly they would not make another such trip. There were eleven passengers including pilot on this remarkable trip.

* * *

One of the pilots on the field had a son who was something like fourteen years of age who had been practically reared on the field, and who was well versed on everything connected with an airplane.

While he had never flown a ship, he very often taxied his father's ship up to the line and also down the field to the hanger. The father flying in one day and in a hurry to catch the bus to town asked the boy to taxi the plane down to the hanger and turn it over to the mechanics.

The lad had done this many times before, and the father entered the bus and rode off to the city with no misgivings or apprehensions. The boy entered the plane and started taxiing off to the hangers. Evidently he gave the ship too much throttle, as the plane, had no load, and it was off the ground before the boy realized it.

He promptly closed the throttle and the ship nosed down, and dragged one wing in the ground and then turned over on its back, and was completely wrecked. The boy climbed out of the wreck uninjured except for a slight cut on his head and a scratched face.

"SKYWARD HO!"
puts the PARKS picture right in front of you

In this fascinating new book you'll see PARKS AIR COLLEGE—the world's greatest aviation school! 40 pages—over 150 pictures—show how Parks trains today's most competent pilots.

Every course is described—the field, hangars, shops, dormitory, planes, instructors, methods—you'll find them all here. Write for "Skyward Ho!" and our special offer for this summer.

PARKS AIR COLLEGE

Section 8-PA, Parks Airport, East St. Louis, Ill.

Aviation Adventure
Big Pay..Thrills..Popularity

THERE is no field that offers such amazing opportunities for daring, ambitious young men as does Aviation! It clamors for men with courage, nerve and self-reliance to fill thousands of highly-paid jobs open only to trained men. Get into this thrilling business while it is still in its infancy and uncrowded! Now—by a unique new home-study plan—you can quickly secure the basic training in spare time. Fascinating, interesting—almost like the work itself. Men with actual experience guide you. They select the lessons, lectures, blueprints and bulletins—tell you what you need to know. New Free booklet *Opportunities in the Airplane Industry* now ready. Tells you how to get into the Aviation Industry. Simply send your name and address for your copy. No obligation.

NOW SENT FREE

American School of Aviation, Dept. 146-C
3601 Michigan Avenue Chicago, Illinois

AIRPLANE AND GLIDER SUPPLIES
Write for free catalog of lowest prices.
JOHN S. COX & SON
222 So. 7th St. Terre Haute, Ind.

Practical Lessons in Flying

(*Continued from page* 44)

hour when the engine is fully loaded or partially loaded as the case may be.

"Let us say that the average aviation engine burns 0.5 pound of fuel per hour per horsepower at full load, and that the rated horsepower at full capacity is 200 H.P. This is simply pure arithmetic from now on. It's easy to see that the gasoline consumption per hour $= 0.5 \times 200 = 100$ Lbs.

"Next, let us assume that a gallon of aviation gasoline weighs 5.75 pounds, then the gallons burned per hour $= \frac{100}{5.75} = 17.4$ gal. At cruising speed, the consumption will be slightly lower than this with most ships because the engine runs at a more efficient speed and at reduced power.

"If a heavier gasoline is used, say a gasoline weighing about 6.0 to 6.2 pounds per gallons, then the gallonage will be correspondingly reduced from the above figures. Now that you know how many gallons your engine will consume, it is a simple matter to compute the number of flying hours from the capacity of the fuel tank.

"Some makers claim a fuel consumption better than 0.5 pounds of gasoline per hour, but when the engines are not running at the rated capacity or are in poor mechanical condition, the consumption may run from 0.5 to 0.7 pounds per hour."

"About how much lubricating oil will be required?" asked Bob.

"This figure varies considerably among different engines, but on the average it will range from 1/10 to 1/15 of the gasoline consumption," replied Ed. "The oil consumption is generally much higher with aeronautic engines than with automobiles because the compression pressures and temperatures are much higher, and more oil is burned in the cylinders under such conditions."

"Does the grade of gasoline make much difference in the radius of action?" asked Bob. "I have heard so much talk about the different grades and makes of gasoline that I am all balled up. Some birds says that 'Excello' is the only gas while others claim that 'Excello' is punk and that 'Bunko' can run rings around it. Just how do we stand on this subject?"

"Well, there is a whole lot of hooey in the gasoline racket," replied Ed, "but if you get a high grade gas bearing a well known brand it will do the work. Using the highest grade gasoline produced by any refiner will give about the same results, and when you hear of any make giving very superior performance over other brands, you can just put the remarks down to imagination or everyday plain lying.

"Modern aviation gasolines are scientifically manufactured by practically the same process in all refineries and have practically the same chemical composition and specifications. Of course, there is a considerable difference between aviation gasoline and automobile gasoline for the aviation variety is designed particularly to be burned in high compression engines at temperatures much higher than the auto gases, and for this reason we must be sure that we are getting aviation gas and not auto gas.

"And you will be surprised to find how much the condition of the engine will affect the flying radius of action," added Ed. "A poorly adjusted carburetor, carbon, leaking valves or other apparent minor defect will certainly run up the gasoline consumption and cut down the flying radius. Ignition trouble eats up the gas to beat the band, so with all these troubles combined the fuel consumption may go up from 0.48 to 0.70 pound per horsepower or even higher. The moral to this story is to keep the engine in condition at all times and particularly when a long cross-country flight is attempted.

"And now that we have thrashed out a few of the cross-country problems, I am going to give you a treat and a thrill at the same time," said Ed. "The next thing on the program will be stunt flying or aerobatics, and I suppose that this is what you have been looking forward to all the time. How about it?"

Bob's face reflected the pleasure that he felt at this announcement. "Gee, are we really up to this point? What do we start with? When do we start? How long before we finish?"

Ed smiled at this enthusiasm, "We'll start with a loop, very likely, and then follow through with the usual line of stuff including Immelmanns, Spins, Inverted flight and all the rest of them. I'll go as far as you like, and then some, if you make the necessary arrangements with the office. Don't forget that stunt flying has a distinct value outside of exhibition work. It gives the pilot greater confidence in himself and shows him how to get out of different predicaments that might otherwise be disastrous without this training. I don't believe in circus stuff, but I do believe that aerobatics should be included in the training of every student who wishes to become proficient in the art of flying."

And so we will leave them for the time and will await further developments in the first of the stunt flights. Let us hope that the safety belts are in good shape and that the controls are working freely when they take their first maneuver.

Quit Tobacco

the easy natural way. Tobacco weakens your sexual glands, destroys beauty. White Cross Anti-Tobacco Treatment is scientifically prepared to aid men and women banish quickly all desire for Smoking, Chewing or Snuff. Pleasant. Harmless. Endorsed by thousands. Established 1912. Write today for free booklet and trial offer. If it helps you, tell your friends. Address: **WHITE CROSS, Inc.** 341 Mfrs. Exchange Building, Kansas City, Mo. Western Offices: Denver—Los Angeles.

Trade-Mark Reg.

Hero or Traitor?

(*Continued from page* 9)

The missing ship, the missing school teacher with a Teutonic name, the man who would give no explanation of his absence, here they were. The obvious result was court martial and sentence to the firing squad. Major Spatz declined to give any reason for his apparent treason. He even smiled sardonically.

The situation looked ominous for the Major. He had been missing unwarrantably and unaccountably from his post for a week. He refused to answer the damaging evidence. Yes, the only thing to be done was to regretfully turn him over to the firing squad.

But before "finis" could be written to the episode of Major Spatz's action, the real custodian of the ship in which the culprit, who was suspected of trying to escape to Germany, flew, had to be traced. And when Captain Hoover was found as the owner of the ship he told a story which made things look very different, indeed.

A man who all alone had nearly paralyzed the German Air Corps in that sector could hardly be executed as a traitor; he was really a hero. And so the Major wasn't shot.

But now the Army faced another dilemma. They certainly couldn't send this man back to train flyers at Issoudun, since it would be a bad example to the student flyers. At length, Major Spatz was given a handful of medals, both of the United States and the Allied Powers, and sent back home. Two months later the Armistice was signed.

AN OPPORTUNITY

to purchase new and used books for your aeronautical library. A wide selection on all subjects is available.

Come in and look over our stock or write us of your needs. We may have the book you want at as much as 50% off.

POPULAR AVIATION

608 So. Dearborn St., Chicago, Ill.

SAVE ON TIRES

LOOK! TIRES NEW LOW PRICES

Why Pay More?

GOODRICH · GOODYEAR · U.S. Firestone *and* OTHER TIRES

Lowest Prices on Earth!

Thousands of satisfied tire users all over the U.S.A. Our 16 years of business speaks for itself. This big responsible company will supply you with reconstructed standard make tires at lowest prices in history—

Guaranteed to give 12 months' service

Don't Delay—Order Today

12 MONTHS' SERVICE GUARANTEED

CORD Tires Size	Tires	Tubes	BALLOON Tires Size	Tires	Tubes
30x3	$3.20	$1.00	29x4.40	$3.10	$1.10
30x3½	3.25	1.00	29x4.50	3.40	1.10
32x3½	3.70	1.15	30x4.50	3.45	1.20
31x4	3.95	1.15	28x4.75	3.45	1.20
32x4	3.95	1.15	29x4.75	3.45	1.20
33x4	3.95	1.15	30x4.95	2.90	1.35
34x4½	3.90	1.15	29x5.00	2.95	1.35
32x4½	3.20	1.45	30x5.00	2.95	1.35
33x4½	3.20	1.45	28x5.25	2.95	1.35
34x4½	3.95	1.45	30x5.25	2.95	1.35
30x5	3.60	1.75	31x5.25	3.10	1.35
32x5	3.60	1.75	30x5.77	3.20	1.40
36x5	3.45	1.75	30x6.00	3.20	1.40
All Other Sizes			31x6.00	3.20	1.40
DEALERS WANTED			32x6.00	3.20	1.40
			33x6.00	3.20	1.45
			32x6.50	3.50	1.65

Send only $1.00 deposit with each tire ordered. We ship balance C.O.D. Deduct 5 percent if cash in full accompanies order. Tires failing to give 12 months service will be replaced at half price.

YORK TIRE & RUBBER CO., Dept. 115-A

3855-59 Cottage Grove Ave. Chicago, Ill.

Glider Club Experiences

(*Continued from page 45*)

arrangements to leave the machine there, it wasn't so bad. His generosity was surely appreciated after the previous incidents and the contrast was made more striking by the fact that there was about eighteen inches of nice Timothy hay all over his field.

This of course didn't help us any but our activities certainly didn't help the hay any either. However, we managed to make some very successful towed flights among which were several hops with passengers although the machine was only designed to carry one person.

The "passenger" was obliged to straddle the fuselage behind the pilot and hang on as best he could. As the picture shows, this position did not offer much in the way of comfort but the added weight did not seem to affect the flying qualities or the stability of the ship.

The hay offered some obstacles in taking off as it caused considerable drag and there was always a large bunch of it hanging on the rear flying wires after each hop. Once in taking off, the rubbing of this hay completely wore off the safety wire and unwound a turnbuckle which let a rear flying wire loose. The ship acted very queerly in the air but I managed to effect a landing without damaging anything except a little aileron fabric.

Most of these flights were made during the time the Hunter Brothers were making their endurance flight over Sky Harbor and they would often fly around overhead, apparently watching our feeble efforts.

And perhaps they were feeble efforts, but to the boys of this club they were well worth the time and trouble it had cost them.

Just Received from England
Now is the time to get your copy of
AUTOMOBILE AND AIRCRAFT ENGINES
By Arthur W. Judge
(*The World-Known Authority*)
Revised, enlarged edition treating upon High Speed Internal Combustion Engines. Large size volume, Royal blue cloth, gold stamped, 324 pages, 115 Tables, special price $8.50.
Send direct to
Popular Aviation •• 608 S. Dearborn St., Chicago

I Taught Myself to Fly

(*Continued from page 46*)

dual controls, but I never had anybody in with me while thus learning.

After a student has this much time in he is ready to leave the field, so pick out a day with a nice steady wind of about twenty miles per hour. Leave the field in a long straight climb, being careful not to climb too steeply. Make a big circle and come in at the other end of the field and set her down, letting her roll till she was settled on all three points. Then gun her again and take right off and continue this for a week until take offs and landings are perfect.

Then the next week get up a couple of thousand feet or so and practice making turns, large ones at first and then smaller ones, and then figure 8's. Then the next week practice recovering from stalls, slips, skids, and tail-spins. Some ships will come out of these quicker than others. In fact some ships are so built that no matter what position the ship is put into she will recover herself if the pilot will just turn the controls loose, and the majority of ships will take off themselves, too.

Now if the student will practice cross country flying, the first thing he knows he will become an expert flyer. I would not advise a man to try any stunts, or go up in bad weather, or at night, but stick to sane flying.

Now this is the way all the old-timers learned to fly in the days before the advent of the flying school. And also during the war over in France, they used to give the boys some old crates with the wings clipped short and let them play tag around a large field.

These ships did not have enough wing surface to fly and the boys used to open them up and get them going like the devil and then jerk them up and they would jump about thirty or forty feet. Then after they had learned the feeling of a ship they were given further instruction in flight.

I think the way I learned to fly is the proper way, that is, from the ground up. The idea of lecturing a student is all right, but taking him up to a safe altitude and then turning the controls over to him is dead wrong. For the only business I know of where you begin at the top and work down is in digging a well.

Blind Landing Devices

(*Continued from page 26*)

also switches the "landing beam" receiving set into operation.

Circling about and returning, he flies between five and ten miles distant from and 500 to 5000 feet above the field along a path indicated by the "runway localizing beacon." This beacon consists of two loop antennas so oriented that the signals of each are of equal intensity along the desired path of the landing plane.

On the plane is an instrument containing two vibrating reeds. The amplitude of the left and right reeds, if equal, tells the pilot he is on the right path. An increase in reception from the right beacon antenna will tell him he is too far to the right, and conversely, if he is too far to the left.

With the aid of his compass and judgment, he now knows two of the necessary measurements of his position. There still remains his exact height, ignorant of which he cannot land.

Some 9000 feet from the field, the "landing beam" receiving set on the plane begins to function. It receives the signals of the landing beam which is horizontally polarized and directed at an angle steep enough so that the line of constant intensity clears all field obstructions.

Along this line of constant intensity, the plane glides to the ground. Visual instruments indicate to the pilot just where his plane is in relation to this strange electrical thread which he can follow through fog and dark to a safe landing.

The end of the field, or rather the beginning of it for the approaching plane is announced to the pilot by still a fourth radio beacon, this time a short range signal which the pilot receives through ear phones as he comes above the field along the path outlined by the other beams and signals.

The most important part of this new method of directing the landing of planes under conditions of no visibility is the landing beam conceived by Mr. Dunmore. In speaking of it, he says:

"The landing path may be so directed as to clear all obstructions. The pilot following the landing path is automatically kept above all obstructions and no longer needs a thorough knowledge of the terrain in order to effect a safe landing.

"Secondly, the landing path may be different shapes to suit different fields.

"A third advantage lies in the fact that in the act of following the landing path, the pilot automatically 'levels off', thereby facilitating a normal landing, albeit somewhat fast."

The ease, simplicity, and low cost of the new blind landing aid along with its practicability demonstrated in test flights from 1928-1930 at Mitchell field and College Park, Maryland, are strong indications that it may become a vital element in the furtherance of reliability and safety on our airways.

AERONAUTICAL ENGINEERING
DEGREE IN 2 YEARS

Save time and money by taking the Tri-State College course in Aeronautical Engineering, 108 weeks. Bachelor of Science Degree. Graduates in Mechanical Engineering can complete course in two terms (24 weeks). Thorough training in all fundamental engineering subjects. Non-essentials eliminated. Courses designed to save student time and money. Flying school facilities available at nearby airports. Enter September, January, March and June. College now in 47th year. Courses are offered in Civil, Electrical, Mechanical and Chemical Engineering. Also Business Administration and Accounting. Living costs and tuition low. Those who lack high school may make up work. Graduates successful. 781 College Ave., Angola, Ind.
Write for Catalog
TRI-STATE COLLEGE

Some Early Novelties

(*Continued from page* 36)

"shell" type. The fuselage was a pressed steel body of very good streamline form, and enclosed the Gnome engine completely. Stiffening ribs were used for the reinforcement of the thin sheet metal so that the body was an integral shell. Steel tubing was used for the wing structure members without external bracing of any sort to cause head resistance, and in spite of the metal construction, the ship only weighed 440 pounds in flying order.

With a 70 H.P. Gnome engine, it flew a trial heat of 210 miles in 2 hours, 12 minutes, or at the rate of nearly 96 M.P.H., this high speed very clearly indicating the effectiveness of the streamlining. The "R.E.P." machine was also of steel tube construction, and we can mention several all-metal ships during 1910-1911.

It might be mentioned, in discussing control systems, that the old Bleriot monoplane of 1909 had a control system that was not so far away from the present stick system. Side-to-side movement of the controls gives lateral balance, while forward and backward movement on the same stick controls the elevator flaps. A separate rudder bar controls the rudder in the same way through crossed wires. The only difference between the Bleriot and a modern stick control lies in the fact that the column was capped by a wheel for easier handling, but this wheel was simply for convenience and could not be turned.

Thus, while we gleam delightedly over the wonderful advance of aircraft during the past few years, yet we have the same old awkward control system that Bleriot used in 1909. The wheel control for large transports is a revamped "Deperdussin" control harking back to the dark ages. And we have just the same difficulty in learning these controls, and just about as many crashes as before.

An eminent college professor, years ago, is credited with the wise-crack that "Anything that looks like a propeller has an efficiency of 70 per cent." However, in spite of this academic blast, the early propellers fell considerably short of 70 per cent efficiency and it was not until wartimes that a satisfactory method of propeller design had been formulated.

In 1910 there were all sorts of propellers, constant pitch, harmonic pitch, expanding pitch, diminishing pitch, etc. They were of wood, metal, wood-metal combinations and even canvas stretched between wood slats. The favorite blade was wood, mostly because of its low cost, and also for the reason that it was possible to make a homemade wood propeller.

From 1903 to 1911, there were many advocates of large diameter slow speed propellers because the slow speed type were manifestly more efficient than the small high speed blades that literally tore a hole in the air at certain flying speeds. The old Wright twin screws turned at about 400 R.P.M., and the low speed largely offset many other defects.

A very simple and effective type was the old Paragon propeller which was an automatic variable pitch type. The center of pressure on the blade was eccentric with the center of the face so that a variable twisting moment took place about the blade center that regulated itself according to the flying speed. The blades automatically twisted themselves into the proper position by changes in the air pressure.

Then came a lot of tinkering with tandem blades that breaks out sporadically at regular intervals even today. Placing two propellers in tandem, one in front of the other, introduces a lot of complications and disturbances that are difficult to overcome, although—heaven knows—there has been plenty of investigation along these lines.

Most of them start out about the same, a propeller of normal pitch in front followed by the rear propeller revolving in the opposite direction and having a pitch speed much greater than that of the front propeller to make up for the velocity of the slip-stream. That's the way they all begin—and end.

Then we get down to the progenitors of the "Auto-giro" of which there were several hundred known by the name of "helicopters." Cornu was an early experimenter along these lines and there was about a ton of rather misleading information published on the subject, but while many of them lifted off the ground, yet they were unstable to the last degree. In the "Auto-giro," unlike the pioneer helicopters, the lifting screw is driven by the translational air stream caused by the motion of the ship through the air, and the blades are provided with a variable incidence feature so that the advancing blade has the same lift as the retreating blade, thus stabilizing the screw.

These are really refinements in detail, but at the same time they are refinements that make the helicopter principle practicable where it was a failure before. A free lifting propeller, not connected rigidly with the engine, permits the propeller to function with a dead engine by utilizing the air-stream.

Helicopters have been under consideration ever since the principles of the helical propeller have been known, and this dates back a great many years. One of the first proposals showed a series of paddles or shovels arranged in a helical curve around a vertical shaft. The effects of counter-torque were also understood so that in many of the early helicopter inventions we find two vertical propellers rotating in opposite directions so as to neutralize the torque.

Many other ideas and innovations of the early days have necessarily been omitted from this discussion, but perhaps I have said enough to convince you that a search through the past records of aviation is not only instructive but highly interesting.

Happy Weigrand's Adventures

(*Continued from page* 18)

shook his tail and sent the tack across the cockpit. Two tacks served to make him uncoil once more.

Fifteen minutes and he would reach his destination. Weigrand shook half a dozen tacks out of the box, covering the floor so the snake could hardly coil without much pain.

Now here is where the snake proved himself smarter than Weigrand gave him credit for being. On the right of the cockpit was a four-inch shelf just below the window sill. On hearing a bumping, slithering noise Weigrand turned. The snake was on that shelf! Even as he watched the snake coiled and leaped to the sill above. Happy was so startled he nearly let the ship go into a nose dive. Quickly he steadied the plane. He was a mile high and four miles from the landing field.

The rattler did not hesitate. With a machine-gun effect of "rat-a-tat-tat" he struck for the flyer's elbow. Weigrand's heavy flying suit protected him. The snake recoiled and struck again. A hit! Weigrand, dizzy from the wound in his wrist, grabbed the gas measuring stick. Before he could use it the snake had struck him in the hand. Then with a great effort the aviator poked the hissing creature out the window.

There was neither time no means to apply a tourniquet to his arm, so Happy sucked out the poison, then pressed his right armpit against the back of the seat, effectively stopping the flow of blood in the wounded arm.

A few minutes later the plane landed. A farmer living nearby helped get a tourniquet on the arm and later a doctor cauterized both punctures. Now Happy Weigrand is as well as ever.

Nowadays Mr. Weigrand has a set of preliminaries to go through before he sets out in his plane. Taking a flashlight to the dark corners, he carefully brushes the floor of the cockpit. No more stowaways in his plane!

NO MORE BIG TIRE BILLS!
GOODYEAR · FISK · Firestone · U.S. AND OTHER TIRES
At ¼ Regular Prices
Tires You Know and Prefer
AT NEW LOW PRICES!
You can rely upon Chicago's oldest and most reliable rubber company to deliver tire mileage at lowest cost. Actual tests on the worst roads in the country prove that our standard brand, reconstructed tires deliver 50 to 60 per cent more service. A trial order will convince you.
BUY NOW
12 MONTHS' SERVICE GUARANTEED
SAVE MONEY
BALLOON Tires
Size Rim Tires Tubes
29x4.40-21" $2.30 $1.10
28x4.50-20" 2.40 1.15
30x4.50-21" 2.45 1.20
28x4.75-19" 2.45 1.20
30x4.95-21" 2.90 1.35
30x5.00-20" 2.95 1.55
28x5.25-18" 2.95 1.35
30x5.25-20" 2.95 1.55
31x5.25-21" 3.20 1.35
30x5.77-20" 3.20 1.40
31x5.00-19" 3.20 1.40
32x6.00-20" 3.20 1.40
33x6.00-21" 3.20 1.45
32x6.20-20" 3.65 1.75
Reg. CORD Tires
Size Tires Tubes
30x3 $2.20 $1.00
30x3½ 2.25 1.05
32x3½ 2.70 1.15
31x4 2.95 1.15
32x4 2.95 1.15
33x4 2.95 1.15
34x4 3.50 1.15
32x4½ 3.20 1.45
33x4½ 3.20 1.45
34x4½ 3.45 1.45
30x5 3.60 1.75
33x5 3.60 1.75
36x5 4.45 1.75
All Other Sizes
DEALERS WANTED
All Tubes New—Guaranteed First Quality
Send only $1.00 deposit with each tire ordered, balance C. O. D. If you send cash in full deduct 5 per cent. You are guaranteed a year's service or replacement at half price.
MIDLAND TIRE & RUBBER COMPANY
Dept. 249 1000-10 W. Sixty-Third Street Chicago

A Tour Through An Airplane Factory

(*Continued from page* 28)

"Here again the jig proves its value. These two sloping platforms support and hold the spars in the exact position desired when mounted on the airplane. The steel structure in the center is a duplicate of that part of the fuselage to which the wings are bolted. The spars drop into their respective positions, the ribs are slipped on and then the internal bracing is installed.

"Every third rib is called a compression rib and as you see divide the wing up into five bays,—as they are called. Running diagonally across these bays are what we call tie rods. By drawing up on these we can exert an enormous tension. The compression ribs are stiffened up with spruce members to offset this tension.

"The result is a wing that is rigidly held in place as it encounters the various air loads while in flight. With no external bracing used, we are entirely dependent upon the assembly of our spars and drag bracing. Believe me, we don't allow production costs to be held down at this point.

"Under actual test, it has been found that our wing will stand over fifteen times the normal air load it will encounter in flight. If you don't believe me, you can call up the University where it was tested, when we get back to my office.

"I'll take your word for it," said Bill. "It is apparent to anyone watching, that the men working here are craftsmen. They certainly know their wood and caseins or whatever you call it."

I WANTED to laugh a little at that one, but I could see Jim was very much impressed, so did my haw-haw up my sleeve.

"To finish with this now," I went on, "there is one more point to bring out. Here in the center of the jig, where the duplicate of the fuselage is located, you will notice how the fittings are bolted onto the spars and pinned with special bolts to the fuselage. By making this assembly in this jig, we know that every wing will fit every fuselage. In our type of ship, the need for absolute accuracy at this point is essential, hence the care used.

"On this next series of benches, Jim, you will see the miscellaneous wing work in progress. Here the cat-walk, tip, and a hundred and one other little jobs are done.

"The most interesting part of this activity is the plywood covering on the leading edge. By soaking sheets of plywood in water we are able to bend them right around the nose of the ribs. The sheets are glued and nailed to the top and bottom of the front spar and to all the ribs. This covering is necessary so that the fabric will not sag in between the ribs. If the fabric sagged, the resulting wing would be something other than what the shape of the ribs are supposed to make it.

"The miscellaneous wood parts, such as floorboards, instrument panels, the luggage compartment, and so forth are made over here, but we can skip that, I guess, unless you want to see it."

"No, go right ahead, Bill. You know what I want to see better than I do myself," said Jim.

"All right, then, Jim,—let's cross over the assembly aisle and see where the steel gets its start."

"Bill, I believe you've got the most interesting job in the world," commented Jim, as we headed for the Welding Department.

"Maybe so, maybe no, Jim," I replied. "I envy our test-pilot's job a lot."

"Yes, Bill, but I'll bet he is envying yours, too. It's human nature to always figure the other fellow's job to be the 'gravy'."

"Remember the old wood and wire crates we flew back in war days?" I asked, as we arrived in front of the fuselage jig."

"I sure do," he said. "They didn't look much like these. Let's hear all about this part of your airplane now."

"To begin with, I want to tell you a little about this stuff. It is seamless steel tubing. This particular tubing is known as Chrome-Molybdenum,—'Chrome-Moly' for short. There are two kinds of tubing used in fuselages, one known as 'low carbon' and the other that which we are using here. 'Chrome-Moly' runs about three times as expensive as 'low carbon,' but it is about twice as strong. In this way we are able to use lighter tubing and thus save on weight but not on strength."

"Might I interrupt, to ask for a brief explanation of these two terms?" asked Jim.

"Sure thing," I answered. "You know that steel is iron with carbon added to it, and the amount of carbon controls to a large extent the characteristics of the steel. The kind adapted to fuselage construction is that with a low carbon content, in other words 'low carbon.' By adding Chromium and Molybdenum to steel it is strengthened considerably without affecting its weight any appreciable amount. Does that give you a good enough idea, Jim?"

"O.K.," Bill. Go ahead with your story now."

"In this rack full of pigeon holes, we keep the cross members and diagonals. These are cut to proper length on a special steel saw and the ends are ground so that they will fit in snugly between the longerons. The length and shape of the ends must be exactly right."

"Couldn't you sort of standardize on the shapes of the ends?"

"No, Jim, that wouldn't be practical. The amount of time it takes to make a weld and also the quality or strength of the weld is largely determined by the fit. If the welder has to put in a lot of metal to make the joint, it naturally takes longer and will probably not be as strong."

"While we are on this subject," I continued, "we might as well mention fuselage jigs. There are many different types of jigs, but they are all for the same purpose,—to hold the steel in place and prevent warping during the welding. Ours as you see is made of angle and channel irons.

"One man on each side of the jig fits in the various members, while two other men weld. From the looks of things here, this fuselage is about ready to come out of the jig. Yes, there she goes now. The welders have shut off their torches and are helping to loosen the clamps that hold her in place."

(*To be concluded*)

SELECTED CLEAR AERO

SPRUCE

Finished to exact sizes for your plane or glider

We have been specializing in high grade spruce for many years. All of our spruce aero stock is selected, manufactured and packed with utmost care and shipped promptly.

LOWEST WHOLESALE PRICES

Samples of our prices, lengths specified or assorted, up to 16'

	Price per ft.
¼x¼, ¼x¼, ¼x¼	.01½
¼x½, ¼x½, ½x¼	.02
¼x¾, ½x½, ½x½	.02½
¾x¾, ½x½, ½x¾	.03
½x⅝, ¼x1, ½x⅝	.03½
½x1, ½x¾, ¾x¾	.04
⅝x1, ¾x1, ½x⅞	.04½
⅝x1, ¾x1⅛, ⅝x1⅛	.05
1x1, ¾x1¼, ½x1⅛	.05½
1x1¼, ¾x1½, ½x1⅛	.06

Quotations from Customers' Letters

Ship me via express 160' aircraft Spruce in 5' lengths. The last order received from you was wonderful material. Will endeavor to send you a large order soon.—C. M. SNYDER, Lockport, Ill.

We enclose money order for $10.40 to cover material as quoted in your letter attached. We have had two previous shipments of airplane Spruce from you and are well pleased with the quality and service.—T. HOWELL, Jonesville, Mich.

PIKE DIAL LUMBER CO.
2263 LOOMIS ST: CHICAGO

Would you like to receive your September copy a week before it appears on the newsstands?
Subscribe to POPULAR AVIATION
$2.50 for 12 issues

PATENT YOUR IDEAS REGISTER YOUR TRADE-MARK BY
Z. H. POLACHEK
1234 BROADWAY
31ST. NEW YORK
REG. PATENT ATTORNEY PROF ENGINEER
WHAT IS YOUR INVENTION?
Send me a simple sketch or model for
CONFIDENTIAL ADVICE
DO IT NOW

LEARN AIRCRAFT DRAFTING
at home
CALIFORNIA TECHNICAL COLLEGE
San Diego California

An Encounter With Savages

(*Continued from page 32*)

We had our labors cut out for us, Miller discovering a broken fuel line which necessitated about a half hour's work.

WE HAD been there perhaps twenty minutes when we heard a rather ominous sound in the distance. We worked feverishly in an attempt to get the ship in repair as soon as possible. As the sounds came nearer they became more distinguishable, and we knew we were soon to be face to face with savages, who, for all we knew, might even be head-hunters! They evidently had seen us land and were coming to hold a little investigation of their own.

With Murchison taking his turn at the pump, I glanced up the river. About half a mile away, rounding a bend in the river, I saw two boatloads of fierce-looking natives paddling furiously towards us, shouting wildly and waving their spears as they came on.

A moment later, Miller and Hollender climbed down off the engine and hurriedly fastened the cowling. "Stay with the pump while I start her up," Miller instructed me.

The natives were only a few hundred feet away as Miller threw in the electric starter. A moment or so later, the Wasp engine sputtered as she drew gas and then broke into a roar.

Replacing the handhole cover, Murchison and I scurried for the cabin. As Miller gave her the gun, he swung the nose around and headed up the river, straight for the canoes in which the savages were riding. They screamed, some with fury and some with fear, veering the boats in towards the river bank just in time to avoid destruction.

As we taxied into position I heard, or rather felt, a thud. It came from the tail of the ship. Going back to investigate, I found a spear which had pierced the metal fuselage and had just missed the duralumin control tube by a bare inch!

With the throttle open we gathered speed and, missing one of the "crocs" by a safe margin, we took once more to the air. Looking down I saw several more boatloads of natives rounding the turn in the river, all the while they looked up and shook their fists and spears at us in brave gestures.

"They're plucky babies when there's a safe distance between them and their foes," I said to the others.

The remark gave Miller an idea. "Let's have some fun," he said. Not waiting for a reply he turned the ship down the river. At a point about two miles below the savages, he turned back again.

When we were about a half mile from the native canoes, the fun began! Miller suddenly put the plane in a power dive straight for the boats! With full power, the plane came on at a speed of about 200 miles per hour, the engine roaring wide open. With scarcely an opportunity to think about what was happening, those natives took to the water in a mad scramble to see who could get there first!

By this time Murchison, Hollender, and I were almost rolling on the floor of the plane in laughter. Just a few feet distant from the canoes, Miller straightened the ship out and began climbing again. For several minutes we watched the dismayed natives gradually pull themselves out of the water. They had had the surprise of their lives!

Our discussion of this jovial little incident consumed most of the balance of the flight, and soon we noted our destination, the little city of Cartagena, on the horizon. A matter of moments, and we came to rest once more on the river.

At dinner that evening, we related our adventure to several of the men connected with the Cartagena end of the airline.

"All of the boys have experiences with those savages sooner or later," said Berenson, Cartagena manager for Andian. But there was a sly expression in his face as he said it. It looked as though we had been the "goats" in another game of "Wolf! Wolf!"

At this point a pilot named Emory spoke up: "Why those savages you talk about were probably trying to do a little trading with you. Probably would have offered you a couple of highly decorated spears in exchange for a box of cigars or something. Why, savages in the interior are only a myth nowadays. They disappeared or became partly civilized years ago."

Defending our cause, I fired a shot. "How about that spear that landed in our fuselage?"

"Where is it? Let's see it," came the response.

The spear had dropped out just as we had taken off, and, as I expected, this explanation was greeted with laughter. Even those of us who had been concerned in the adventure found ourselves joining in the gleeful reaction.

"Anyway," Miller said, "the hole is still there."

"How many knives did you break putting it there?" asked Berenson facetiously.

"You guys are too hard-headed," responded Miller. "We'll save this stirring tale 'til it will be appreciated."

But the members of our party knew that they had had a thrilling day, regardless of whether the savages were savages or merely rough-looking customers.

Anyway, the incident quickened my respect for those pilots who risk everything to bring the advantages of civilization to the farthest reaches of this earth of ours—men who flaunt their skill and bravery in the face of danger whenever it presents itself.

POPULAR AVIATION
Invites You—

TO JOIN the growing ranks of Popular Aviation subscribers. They all receive their copy as soon as it comes off the press. A full week before their friends can buy it on the news stands.

Whenever you want information about planes, schools, gliders, inventions or employment—just drop us a card and get an immediate answer.

Some crackerjack articles are on their way. New lightplanes, new gliders, new inventions. Some true war stories. Many thrilling experiences—by amateurs and professionals, and of course some interesting model construction articles.

If you too want to become a privileged character, join the ranks, and include your name among our subscribers. Do it now! Before you forget! Get the next copy of POPULAR AVIATION one full week ahead of all news stand buyers. Do not send any money. Just fill out the coupon and mail it to us and a bill will come later ($2.50 for one year).

POPULAR AVIATION July
608 S. Dearborn St.
Chicago, Ill.

Please enter my subscription to POPULAR AVIATION for one year. I want to be sure to get each copy as soon as it is off the press, before it can be purchased at the news stand. Send me a bill later for $2.50.

Name.....

Address.....

City.....State.....

XUM

The Christmas Bullet

(*Continued from page 37*)

Island. He circled her house and came back, flying low into the field. He hit a tree."

"Lieut. Jolly, took her up after she was rebuilt and spun into the ground from a great height. He was testing her in a dive and while doing better than 300 miles an hour he tore her covers (fabric) off."

In those days the airplane builders did not have aeronautical data to tell them of the pressure at terrific speed. The English, French and Italian fliers too, were killing themselves by ripping their covers off. Later, of course, they began to put veneer on the leading edge of the wings and overcame that danger but a lot of good men died uselessly.

In spite of what happened to the Christmas Bullet, Dr. Christmas is a considerable factor to reckon with in aeronautical circles, having to his credit over a hundred bona fide inventions, one of which is the balanced aileron. The U. S. Government paid him a hundred thousand dollars to release it to the airplane manufacturers. He designed a huge passenger plane to carry 207 passengers and four of these gigantic flying wings which will dwarf the Do-X may be ready this coming Autumn.

At the present time he is working on plans for a new type of plane for the Schneider Cup Races. It will have a wing spread of 32 feet, twin propellers and a variable chord and Dr. Christmas estimates that it will do over 400 miles per hour. It will have many new features which will cut down resistance thereby doing away with excessive horsepower.

"If you could broadcast a message about aeronautics far and wide, what would that message be?" I asked Dr. Christmas.

"Just this, son," he added seriously, "Tell America to pay less attention to horsepower and more to cutting down resistance. Right now we're thinking in reverse. We plan to build a ship capable of carrying so much horsepower. What we should do is to build ships, designed to have the absolute minimum of resistance. And then you can bet your bottom dollar that speed will come as a result, just as surely as day follows night."

Aviation Rings
Sterling Silver
$1.50 ea.

EMBLEMS FOR FLYING SCHOOLS, CLUBS AND AIRCRAFT MANUFACTURERS

C. F. and Mechanic Pins $1.00 Each
Sterling Silver Identification Wristlets $2.50 ea.

TROPHIES — LOVING CUPS — PLACQUES

JOHNSON CO.
352 W. 13th St., "Wing Building" New York, N. Y.
Write for catalog P

Is the Battleship Doomed?

(*Continued from page 24*)

proach. Which is a trifle discouraging, if repeated several times. And a bit rough on the nerves.

Long before this, also, the Pig Iron Boats have catapulted their defense planes, or else the Fleet Carrier has turned loose a flock of fighting planes. If any of these fighters of the Navy get in on the party before the bombs have been released, the bombers might just as well lay their eggs anywhere in the ocean, and call it a day! Some of these bombers may get home all in one piece. They may knock over a few fighters with their free machine guns. And, in the general melee, both hostile bombers and protecting fighters may get plunked by a wild burst of Archie from the ships below them.

Whatever does happen, it is safe to bet that with these inherent difficulties and limitations handicapping the bombers, the good old first line battleships will be more annoyed than hurt.

The aircraft, however (while they may not through their own direct offensive win a victory prior to the final fleet engagement), will greatly influence the final outcome of the next great naval battle. An Admiral of a Fleet today bases his plan of action upon the information he has before him. He must have knowledge of the enemy's strength and of the manner in which the enemy's force is deployed. The sea commander who first secures such information is in a superior tactical position. He can deploy his own forces so as to strike most effectively before actual contact is made.

It is the Air Scouts who will be called upon to obtain this information. The information must be exact; and by the same token, it is of paramount importance that the man who is to bring home the data be an aviator born and bred in the knowledge and traditions of the sea.

He must be trained in Naval Strategy and Tactics in order that a glimpse of a hostile fleet at sea may convey something more to him than that they are merely so many ships. At a glance he should be able to distinguish the type of each ship and, from their relative disposition, the type of fleet formation, i.e., whether it is cruising, offensive, protective or defensive. This data must be accurately transmitted, and with intelligence, to his Commander in Chief.

WHEN the opposing Fleets finally grapple, the deciding factor will be the accuracy of the big gun fire from the battleships. The effectiveness of the fire from each ship will depend on the "aircraft spots" received in the First Control Station of that ship from its aircraft spotter, who will be flying over the enemy fleet, observing the fall of shells from his own ship. What a picnic such a battle is going to be!

Imagine two columns of fifteen battleships, some twenty miles apart, hurling tons of steel back and forth at one another. Over each fleet, or halfway between, will be the airplane spotters of the opposing fleet. Each spotter will have to know which enemy ship is the target for his own battlewagon; then he must be sure that the shots he is reporting actually come from his own ship. What a task these aircraft spotters are going to have! Perfect co-ordination—possible only as a result of long training, complete understanding and flawless teamwork—can produce the results which will spell victory.

Nor will these aircraft spotters have the sky to themselves, let it be said. Squadrons of fighting planes will go ring-around-the-rosy, sniping at the spotters in between. The victorious fighters will harrass and destroy the enemy spotters. Torpedo planes and bombers may try to sneak in on the show, but they will at this time play only a minor role. The fleet whose fighters secure control of the air will possess a tremendous advantage for its aircraft spotters will work comparatively unmolested—and through them and other scouts the Commander-in-Chief will be advised of the enemy's slightest move, as well as of the tide of battle.

Picture the other fleet, which has lost control of the air! Their aircraft spotters have either been driven off, or are being attacked and harrassed, so that they cannot spot the fall of shells from their fleet at all—or at best, but very inacurately.

Scouts will be forced down, and the base of the losing fleet's aircraft, the carrier, will be attacked from the air as well and rendered useless as an aircraft carrier. This latter can be effected by one or two 50 pound high explosive bombs dropped by dive bombers on the flying deck of the carrier.

The "mopping up" of the beaten fleet will be done largely by aircraft. Picture the remaining battleships of this fleet scuttling for safety! The havoc wrought by 14 and 16 inch shells will have made a shambles of their upper decks. The exposed anti-aircraft guns and the delicate fire-control system essential to their effective use will either be completely out of commission or badly damaged. Unhampered by accurate anti-aircraft fire, or by attacks from fighting planes, torpedo planes and bombers may now work under favorable conditions with telling effect, and only impossible weather conditions can stop them!

The answer is obvious: Our Pig Iron Boats are still the backbone of our naval force. Naval Aircraft, however is now the most important adjunct to victory. Aircraft, alone, cannot achieve victory—yet without them victory will be impossible. Both battleships and aircraft are indispensable. Neither can replace the other; without the one, the other is useless. And the two joined, through perfect teamwork, combine to form the bone and sinew of our national defense.

XUM

War Pilot Meets Rescuer

(*Continued from page 25*)

Relieved of his enemies, Lieut. Pearson managed to set his Breguet down in a small clearing in the Argonne forest. Both Pearson and Newby were given immediate medical aid, and are alive today to tell the story. Lieut. Pearson has never flown since the war and does not contemplate doing so in the future.

At the conclusion of his talk, Mr. Pearson was engaged in conversation with Captain F. O'D. Hunter, wartime "Ace" and present commander of the 95th Pursuit Squadron, Rockwell Field. Captain Hunter had missed Mr. Pearson's talk and was so much interested in it that Mr. Pearson obliged by repeating it. Mr. Pearson had just arrived at the point where he had been hit, when Captain Hunter asked the date of this encounter.

"October 4, 1918," Mr. Pearson replied.

In a quiet voice, Captain Hunter said: *"Pearson, I was the pilot of the Spad that shot the two Pfalz's off your tail!"*

The general orders of Captain Hunter were produced, and every phase of Mr. Pearson's story, as well as Captain Hunter's episode, was verified. Needless to say, Mr. Pearson was astounded.

After twelve and a half years, these two intrepid flyers met. Neither one had ever learned the other's identity or what had been his ultimate fate after that eventful day. As the saying goes, after all, it's a small world we live in.

Questions and Answers Department

(*Continued from page 40*)

Further, most of the structural members of a pusher are out of the high velocity slipstream and this materially reduces the resistance losses common to a tractor with struts, braces and landing gear full in the slipstream.

Again, the propeller of a pusher type acts on the wake or following air stream so that the overall efficiency is considerably improved even though the efficiency of the propeller itself may be somewhat diminished due to its action on disturbed air.

There has been much argument on the subject of pusher propeller efficiency, one outstanding criticism of this type being the statement that the efficiency is greatly reduced by the reason that it works in air that has been previously disturbed by the wings.

While this may be the case to a somewhat limited extent, yet it must be borne in mind that the disturbed wing stream is not rotary and that the wake traveling in the direction of the ship very materially improves the reaction of the propeller blades. With a tractor propeller, the slip stream is thrown down into the low pressure zone on the wings, thereby disturbing the wing reaction to a greater extent than the wing stream disturbs the propeller blades.

* * *

A. W. B., Jamestown, N. Y. Was Dornier a German? How much of the Dornier DO-X was made in Germany, that is, where did Dornier get the parts for this ship?

THE engines on the Dornier ship are American designed and built. Just where the other parts were obtained is not known. The ship itself was built in Switzerland because of the restriction imposed upon German aircraft construction by the Versailles treaty. Dornier himself is a German.

* * *

S. W. A., Toronto, Can. Is the parasol monoplane a recent invention?

NO. ONE of the first true parasols was the Santos Dumont "Demoiselle" that dated back to about 1908, and one of the first parasols with a fuselage was the Morane parasol of 1916-1918.

* * *

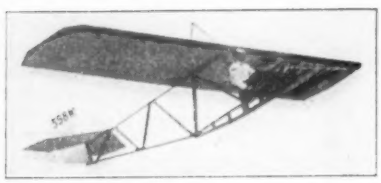
A. A. G., Richmond, Va. Were single surface wings ever used on full size airplanes, and, if so, how did they work? It seems to me that wings of this sort would be much simpler and cheaper to build and would be desirable if they were at all efficient.

SINGLE surface wings were used on many of the early ships, the Curtiss pusher being one example and the H. Farman another. Considering the small engines used at that time, and the fact that over 50 m.p.h. was attained by 25 h.p. to 30 h.p., it can be said that they were not as inefficient as they looked.

READERS

POPULAR AVIATION will be very glad to forward letters from readers direct to any aircraft manufacturer. Perhaps you were especially interested in a particular lightplane, model or glider described in this issue. Merely write a letter addressed to the manufacturer whose product interested you, asking for further particulars, send it to POPULAR AVIATION, and it will be promptly forwarded.

TWO DEPENDABLE MEAD PRODUCTS



The Old Standby
THE JUSTLY FAMOUS RHON RANGER

GLIDING AT ITS BEST

A new Service Soarer
THE CHALLENGER MODEL C 3

If you now own a Rhon Ranger or contemplate purchasing a primary glider, remember that it is possible to convert the standard Rhon Ranger into the Challenger, and in this way get the experience from not only a primary, but also a secondary type glider, without buying two complete gliders. The Challenger Model C3, however, surpasses the converted Challenger in performance.

Popular Aviation selected the Rhon Ranger as being the primary glider most suitable for home construction for its readers. Every day new records are won by Popular Aviation readers who have built Mead Gliders. A recent prize winning Rhon Ranger, owned by the Victoria Park Gliding Club took first place in a glider contest held in Victoria Park, Western Australia.

The following prices show how easy it is to own a Mead Glider:

CHALLENGER MODEL C3, Complete Knockdown Kit	$175.00
CHALLENGER MODEL C3, Ready to Fly	575.00
RHON RANGER, Complete Knockdown Kit	89.50
RHON RANGER, Ready to Fly	375.00
CHALLENGER CONVERSION KIT (This completely converts a Rhon Ranger into the Challenger)	44.00

All Mead kits may be purchased in progressive construction kits on the installment purchase plan.
You can start building your Mead Glider for as low as $15.00. This first kit completes the fuselage.

For full particulars send 10 cents for our latest catalog and descriptive literature on Mead Gliders and glider supplies.

MEAD GLIDERS

DEPT. E 10 — 12 So. MARKET STREET — CHICAGO, ILLINOIS

The Suicide Patrol (*Continued from page* 8)

them. This machine had been unable to catch up with its own formation.

The patrol had barely crossed into enemy territory when Lieutenant Sidney Howard,* flight leader, realized that a battle was unavoidable. The anti-aircraft batteries began shelling the De Havilands, and this was sure to attract the German pursuit planes. And it did attract them but not until after the airmen had dropped their bombs with excellent effect, the one encouraging feature of the raid.

The Americans had turned for home when five yellow and black Fokkers slid down on them and opened fire. On the third burst Lieutenant E. C. Leonard sent one of the Germans down out of control. The others withdrew and waited to attack until twelve more Fokkers drove through the De Havilands from in front. Then the battle began in earnest. To avoid a collision, Phil Rhinelander, pilot of one plane, dropped below the formation. Lieutenant Merion C. Cooper † and Lieutenant Leonard went just behind him to protect his rear.

But at this moment five Fokkers attacked Cooper and Leonard, then six more dived through the formations of De Havilands and Fokkers above to help overwhelm the two separated planes. The German's primary aim of breaking up a formation had been partially realized in the very beginning.

Our observers fought bravely and well with all the means at hand, but even the bravest man cannot overcome insuperable odds. Presently, one of the American planes went down, then another fell out of control, finally a third. The Fokker swarm had literally overwhelmed them, and they closed in to finish up the other three machines of the main formation.

These three were headed towards Germany; somehow in his maneuverings Howard had made a slight turn and his controls had locked on him. Try as he would he could not get his plane to turn about. Such luck was almost a death knell to a plane in the critical condition of being riddled by the enemy.

While Howard was not aware of what had happened, his comrades saw that Howard's observer, Lieutenant Parrott, had fallen into the cockpit and across the controls. The two remaining machines—Noriss and Waring in one, Clarkson Potter and George Schultze in the other dived in to protect Howard's rear, though it must have taken supreme courage to do so under the circumstances.

After a great deal of effort, the enemy punishing them every minute, Howard got his plane turned towards home, and the three of them blasted their way through a wall of Fokkers, thanks to the splendid courage of Howard's protectors and his own remarkable presence of mind.

When the home airdrome was reached, it was discovered that Lieutenant E. A. Parrott had been killed and his body had fallen across and jammed the controls of Howard's machine, thus making it difficult to operate. Howard's machine was a write-off. One of the struts had been shot off and two others splintered. Even the floorboard of the cockpit was riddled.

The night following the Dun-sur-Meuse raid was perhaps the saddest in the bitter history of the First Day Bombardment Group. Parrott was dead; five machines were missing from a single mission. Around the airdrome everybody was restless, hoping that a telephone call would bring them the glad news that some of their comrades had made our side of the lines.

No such call came, and the next day the records showed the following missing in action after Dun-sur-Meuse raid: Philip Rhinelander, Harry Preston, David Harris, Earl Forbes, Richard Matthews, Everett Taylor, G. B. Wiser, Glenn Richardson, Merion Cooper and E. C. Leonard.

BECAUSE it is as thrilling an experience as ever happened to any pilot, I shall recount here what befell Cooper when he and Rhinelander became detached from their formation.

In spite of Cooper's attempt to aid Rhinelander, the seventeen Fokkers attacking the two of them soon drove Rhinelander's plane down out of control. A moment later an explosive bullet in the gasoline tank set Cooper's plane on fire. At the time, he thought his observer dead and prepared to jump, believing that death awaited him no matter what course he took.

But just as he was ready to dive from the plane, Cooper looked back and saw his observer show signs of life. Instead of jumping, therefore, he consigned himself to a hell of flames in the dim hope of somehow getting his ship safely to earth. As he and Leonard shot downwards, the flames crept up and burned his arms so badly that he could no longer hold the stick with them. *Crossing his arms, he held the stick between his elbows.*

During the first part of the descent Cooper had turned off the gasoline feed. Either because of this or because the gasoline leaked out through a hole in the tank, the hellish rush of flame diminished before he reached the ground, and he was able to crash his partially consumed plane in a way that saved himself and observer from further injury. And all of this he accomplished though suffering agonies from his burns.

It was discovered at the first aid dressing station where the Germans took their prisoners that Leonard had been badly wounded by a bullet which passed through his chest and shoulder.

Cooper was finally sent to a hospital near the Russian border. From time to time the surgeons at this hospital urged Cooper to let them amputate his arms. He steadfastly refused and finally regained the use of one of them.

Soon after the Armistice was signed, Cooper was released from the hospital and returned to Paris. While reporting to the personnel bureau in Paris in an outfit which indicated neither his rank nor status, he heard the colonel in charge dictate a telegram to J. C. Cooper, Jacksonville, Fla., stating that no reports had been received in regard to his son, but that he was last seen going down in flames over the German lines. During this incident, Lieutenant Cooper, appreciating the grim humor of the situation, remained silent. Then began an interview in which Cooper requested information as to the whereabouts of Lieutenant Leonard, his observer.

"Who are you?" asked the colonel.

"Sir, I am Lieutenant Cooper."

ON ARMISTICE DAY a picture of the 20th Squadron was taken on the field at Maulan. Of the original detachment of flyers assigned to it but six were left. They were: Captain C. G. Sellers, Lieutenant Gardiner Fiske, Lieutenant A. F. Seaver, Lieutenant Sidney Howard, Lieutenant J. Y. Stokes and Lieutenant W. S. Holt.

On the front a total of 54 days up to and including the date of their last raid, they had had seventeen killed, seven made prisoners and at least six wounded in action. In other words, out of a total of 36 flying officers, which was full strength for a bombing squadron, 30 had been lost in action.

Remembering that weather conditions and other reasons prevented them from operating on a portion of the 54 days they actually get credit for being in action, one realizes the fearful losses they sustained. It is extremely unlikely that any unit in any arm of the American army lost five-sixths of its fighting personnel during a period of 54 days in action.

To my mind the three squadrons that bore the brunt of our day-bombardment work wrote the brightest chapter in heroism of all the American forces engaged. I except neither infantry, artillery, engineers nor signal corps. The achievements of our day bombers, considering the conditions confronting them, were magnificent. They stand without parallel by any of our armed forces at any time during the life of the nation.

By achievements I do not refer primarily to the amount of bombs dropped. I think only in terms of the superb courage it required to face almost certain death day after day, knowing that one had the remotest chance of surviving. Asking a formation of American day bombers to fly into the face of a mass formation of

---

**Now the well-known playwright.*

†*Now an adventurer and soldier of fortune. Producer of the motion pictures "Grass" and "Chang."*

XUM

Fokkers was like asking a doughboy to take a wooden sword and attack three members of the Prussian Guard, armed with bayonets.

The deeds of Frank Luke in pursuit work were without parallel in that branch of the Air Service, but there were many of our day bombers who had achievements to their credit ranking just as high and who deserved the highest honor that the nation could bestow upon them.

Their work lacked the brilliant quality of Luke's performance and did not, therefore, capture the public imagination; yet their chances of coming through a patrol unscathed were much less likely than Luke's chances. To face these conditions, I say, required a courage that I cannot even imagine.

As a pilot who flew over the American army in its three major offensives I wish to state candidly that no conceivable power could have induced me to fly a De Haviland on a bombing raid. Neither devotion to duty, threats of punishment, money, love nor surety of future blessedness. I respect amply what pursuit pilots and observation pilots had to cope with; what day bombers had to cope with fills me with fear and shuddering.

To think that bombing pilots and observers lost caste in the beginning of our operations among their fellows and in the public eye because it was less spectacular than pursuit work is enough now to make one gnash his teeth with rage.

Pursuit flying had the dash of color and romance. It required daring. Day bombing work called for super daring.

BUY THESE BOOKS NOW

Bargain Sale — Half-Off

A RARE buy—Half price! Here are 14 books that can be purchased at **50c on the dollar.** POPULAR AVIATION is overstocked on these valuable textbooks and will sell them at a tremendous discount. All books are brand new—a particularly good buy for flying schools. First come, first served. This offer is good only until the supply is exhausted. With few exceptions there is only one copy available on each title. Rush your order at once—if the copy you wanted is already sold, your money will be returned. The retail price is listed in every case.

These Prices Are All Subject to 50% Discount

A wide selection of other books are available at reduced prices—write us your needs.

1 Civil Aviation
PRICE—$2.50

In 1926, under Government supervision, this comprehensive review of the accomplishments and problems of Civil Aviation throughout the world was published.

2 Pressure Airships
PRICE—$8.00

Part I—Nonrigid Airships, by Thomas L. Blakemore.

Part II—Semirigid Airships, by W. Watters Pagon.

Technical descriptions and engineering date relating to the component parts of nonrigid and semirigid airships including a simplified method for the design of envelopes for semirigids.

3 Aerial Photographs
by Dache M. Reeves
PRICE—$5.00

Explains characteristics and military and naval applications of aerial photographs. 123 illustrations. The first part of this volume explains photographic features and the technicality of recognizing objects. Part II explains the application of photographs to definite military operations.

4 Wireless Telegraphy
by W. H. Marchant
PRICE—$2.25

201 illustrations. A complete handbook for the use of operators and students. It is of tremendous value for students preparing for the Postmaster's Certificate in Radio Telegraphy.

5 Aviator's Flight Logbook
PRICE—$1.50

A complete flight logbook containing all air commerce regulations up to and including March 22, 1927.

6 Charles Lindbergh
by Van Every and Tracy
PRICE—$2.00

A condensed life story of the thoroughly colorful and interesting career of Charles Lindbergh.

7 Airplane Engines
by Lionel S. Marks
PRICE—$6.00

A detailed explanation of how airplane engines operate. A discussion of the essential details of those engines which have survived. Most of the material in this book was published confidentially during the war by the Government. The constructive details of allied and enemy engines during the war are made available.

8 Aerostatics
by Edward P. Warner
PRICE—$3.25

Balloons of all classes, while in equilibrium or moving vertically, are discussed fully for the information of pilots; in addition the subject is treated mathematically for students at aeronautical schools.

9 Winged Defense
by William Mitchell
PRICE—$2.50

Winged Defense is a bomb dropped in the lap of American complacency; it is at once a warning and a plea for sanity and safety. When such men as the former A.E.F. air commander speak, it is wise to listen.

10 Free and Captive Balloons
PRICE—$5.00

Part I, by Ralph H. Upson—**Free Balloons**—their structure is described; also the art of ballooning and the organization of balloon races. Part II, by C. deF. Chandler, **Captive Balloons**—the various types are described technically with many drawings; power winches and accessories are covered. Part III, by C. deF. Chandler—**Fabrics for Gas Envelopes.**

11 Transport Aviation
by Archibald Black
PRICE—$3.00

Transport Aviation clearly analyzes the achievements and possibilities of air travel. It is a fascinating and appealing story. The book gives complete and accurate figures on all costs and returns on air transportation as well as detailed technical data on every phase of equipment and upkeep.

12 Elements of Aviation
by Virginius E. Clark
PRICE—$3.00

A simple explanation of airplane flight principles without complicated mathematics. Col. Clark, the author, is a graduate of the United States Naval Academy. He has designed the airfoils used on many of the most successful airplanes built in the United States, including Col. Lindbergh's "Spirit of St. Louis." The facts presented may prevent over-ambitious designers or builders from violating some of the immutable laws of nature.

13 Measurement of Fluid Velocity and Pressure
by J. R. Pannell
PRICE—$4.00

A valuable textbook on the measurement of fluid velocities and pressure.

14 The Force of the Wind
by Herbert Chatley
PRICE—$2.00

A hand book dealing with the subject of wind pressure in relation to engineering. The formulas used are as simple in each case as modern accuracy will permit, but exclude all matters not immediately concerned with wind force or which have not yet attained engineering importance.

ORDER BY NUMBER

POPULAR AVIATION Book Department
608 S. Dearborn St.
Chicago, Ill.

Please send me at once the following books, numbered .....

Enclosed please find $..... (stamps, check, currency, or money order).

NAME .....

ADDRESS .....

XUM

An Airy Chat With the Editor (Continued from page 4)

to landing speeds. In a list of ninety planes I found only five instances in which may calculations were at all near the advertised speeds.

If this is true, isn't it about time that the difficulty should be solved? No wonder there are a lot of crackups, a good many because the pilot may swallow the false propaganda of the company from whom he bought his plane and some day may try to slow down to that speed. Result—a stall, spin and another black eye for aviation.

Mr. Moss has asked his own questions, so there seems to be nothing more for us to say.

* * *

MR. M. A. ANDERSON of 1270 E. 83rd St., Cleveland, Ohio, has the following proposition for model builders:

I have been following your chat for some time and I think it is the real thing.

What I am interested in now is forming a nation-wide Model Glider Club. At present I have formed three branches in this city and expect more to join. I will be glad to receive letters from anybody who would care to help me make this club possible.

The purpose of this club is to bring a new form of contest about, a nation-wide model Glider Contest.

At present I am building a 94-inch model sail plane fitted with set controls.

There's a chance for some of you fellows. We know that Mr. Anderson will be glad to hear from any of you.

* * *

FRANCIS KALING, Reed City, Michigan and R. W. Burns of Kevin, Montana, both wrote and asked if it was necessary to get Department of Commerce licenses for the Rhon Rangers they had built from P. A. plans. Mr. T. E. Mead of Mead Gliders furnishes the following answer to this question:

It is not necessary to license your glider or to obtain student permits or pilot licenses yourself, so long as the glider is flown on private property and for pleasure only. Should you conceivably use your glider for commercial purposes in inter-state commerce, it would be necessary for both pilot and ship to be licensed. So far as we are able to determine, no one can force you to license your aircraft, nor keep you from flying it merely because it has no government license. We suggest, however, that you at least secure an Identification Mark for your glider by applying to the Aeronautics Branch, Department of Commerce, Washington, D. C., for proper application blanks.

* * *

FLOYD PETERSEN of Washington, Pennsylvania is an up and coming young fellow that is learning the control of a plane without leaving the ground, but read his letter.

A few weeks ago I built a coaster in which I have learned to use the rudder control of an airplane. It was built in the form of a small airplane fuselage on four coaster wagon wheels.

The steering was done with the rear wheels by a rudder bar in the cockpit. The rudder bar was connected to the rear axle by ropes and the control of the coaster was very much like the rudder control of a plane.

The only danger in operating the coaster is danger of upsetting, as the control is so sensitive that the first time I attempted to ride in it I turned so sharp that I was thrown for several feet. I believe that if the front wheels were placed farther apart that this danger in piloting the coaster plane would not be so great.

* * *

DON BOGGS wrote us several times this month and, while we won't quote from his letters, we want you to see this picture we asked him to send

Admiral Byrd greets Don Boggs, P. A. fan.

us. Yes, sir, that's Admiral Byrd shaking hands with Don himself.

The two met when the Admiral stopped off at Decatur, Ill., and visited the sanitarium where Don is. Now Don is the proud possessor of Byrd's signature in his aviation scrap book. Byrd is a "peach of a good egg—the best sort of a man one can meet," says Don.

* * *

NOW let's trot around the world and see what some of our foreign readers have to say. Here is Mr. N. Canute, Honorable Secretary of the Victoria Park Gliding Club at Victoria Park, Western Australia who writes:

I have great pleasure in writing to tell you how satisfied I am with your book POPULAR AVIATION. *I have read this book monthly for two years now and find that it is the best book about aviation for its price.*

In August issue you published "How to Build a Rhon Ranger" and we took the plans and built one. Truly it is the best glider in Western Australia and at the Glider Pageant of Western Australia, held on Sunday last, our club drew the first place with another Rhon Ranger. I can honestly state that I would recommend POPULAR AVIATION *to my best friends. Later, it is the club's intentions to build a large type of sailplane, so I hope* POPULAR AVIATION *publishes a plan of one.*

Thanks for the bouquet, Mr. Canute!

* * *

ANY of you who have been reading the Chat for some months past are by this time acquainted with the three musketeers of Havana, Cuba—Tabio, Pina and McGrigor. They are good friends and P. A. readers and hardly a month goes by without us hearing from at least one of them. This month we have the following letter from Albert McGrigor.

This is the second time I write to your magazine. In my first letter I expressed my inconformity with a Gotha you had pictured in the war plane section; and now, I want to let out a wail like a fog horn.

Why all the noise about Rickenbacker? I'm positively fed up with the terrible ballyhoo formed about his head. Everytime I open an aviation magazine he is spattered all over the place either endorsing advertisements with his signature and invariably having a paragraph dedicated to proclaim his superhuman deeds, writing articles with an authority that would surprise Papa Bleriot himself, or having articles written about him.

Getting down to facts, what did he do? Bring down 25 enemy planes during the War? Well, what of it?

If I am not mistaken, these were brought down in the period that elapsed between April, 1918, and November of that same year, or seven months. Bishop, England's leading ace, shot down that same number in 12 days; he also attacked a German airdrome single-handed and shot down three planes before his ammunition gave out, and when he became so valuable to the English air forces that his retirement from the front was ordered, he asked for one more day in which to fight and then proceeded to shoot down five more ships in a two-hour flight. All this was done in a one-gun Nieuport 16, not a two-gun Spad 13.

They say Rickenbacker specialized in scraps with formations of up to eight German planes. Fine! Major James McCudden, V. C., attacked a squadron of 25 ships, shot four out of control and escaped unscathed. And when I say attacked, I mean attacked and not attacked by.

I could keep on indefinitely telling of the exploits of other aces like Fonck, Guynemer, Richtofen, Udet, etc., that would make Rickenbacker look like a very green pea beside a football, only you might fall asleep.

How come he was awarded the Congressional Medal after 12 years have passed since the World War? I am very strongly suspecting he has a press agent. It must be so. It is the only explanation for his sudden rise to heights unknown even to Lieut. Apollo Soucek. I would also like to know why his book "Fighting the Flying Circus" cost two dollars when it used to cost only one—before his meteoric ascent.

If you ask any real war pilot his opinion about Rickenbacker, I am quite sure the answer will be: "A good pilot and a courageous fighter." And may I add that during the World War there were quite a lot of them? If you're honest with yourselves, you'll recognize that what I say is true and, due to the fact that were these statements published, there would be many a disillusioned spirit, I don't think you're game enough to do it. Are you?

Perhaps McGrigor is a Scotchman and that's why he won't give Rickenbacker any credit.

* * *

WE HAVE two articles here in the office and we can't quite decide whether or not to run them, so we're just going to tell you about them and ask you to help us decide.

The first article tells just how to

XUM

build a sensitive and accurate air speed meter to be used on glider tow cars. Glider flyers will know the value of this instrument without us going into any further detail.

The second article gives complete directions for building a short wave radio receiver for gliders. It has been successfully tested and found to be of considerable value in controlling the movements of student pilots. This article, of course, would be followed by a similar article describing the construction of a portable transmitter to be used by the instructor.

We would like to know whether you readers want these articles published or not and we would like to have you send in your vote, either yes or no, to POPULAR AVIATION.

* * *

JOSEPH S. BROWN writes that he is in the market for a two-place plane suitable for any motor up to 60 horsepower. It can be any type of design or construction and may be covered, uncovered or damaged slightly. Mr. Brown would be glad to hear of anybody who has such a fuselage without motor and he will receive letters addressed to Cavetown, Maryland.

* * *

W. DELANEY PIERCE of Pitman, N. J. sent us a couple of photographs of the Camden County Vocational Schools Aero-mechanics shop. Thanks, Del, we were glad to see such an up-to-date school-shop. You must have a great time working on that Vought plane and tearing down all those 25 engines.

* * *

THE Bald Eagle Aviation Club at 7915 Exchange Ave., Chicago, sent us a photograph of their De Hesse glider. It seems that they just hitch their glider on to the back of a car and tow it out on its own wheels for a day of picnicing and gliding. They will be glad to hear from any glider enthusiasts who care to get in touch with them.

* * *

THE P. A. artists are still on the job. This month we got six sketches of various war planes as well as some keen action drawings from a New York City artist who forgot to give us his name. If he reads this he will know that we appreciated receiving these excellent samples of his ability with a pencil.

* * *

WALTER DOSIEN whose model DoX appeared in the June Airy Chat dropped into the office the other day. He wants to sell this model, so if any of you can help him out, he would be glad to hear from you. Address him at 934 Center Street, Chicago.

* * *

AND now we are up against a mystery. Here's a letter from Walter J. Balchunas of Rahway, N. J.:

It may be of interest to you to know that a mysterious bi-plane was sighted four miles west of here at 10:30 eastern day-light saving time on Saturday, June 13, 1931. This plane is believed to have had a new type motor installed in it. The plane was sighted at altitude of 1,800-2,000 feet. It did not carry any license number upon it. The speed was roughly judged at about 75 miles per hour cruising speed.

This plane is believed to have carried a compressed air motor, as its motor was noiseless. It is believed that it has been privately experimented on and no knowledge of it opened to the public at large. We believe that this is correct, as we did not hear any drone from the motor and it passed over right above us. If possible, we would like information pertaining to this.

Now what do you make of that? We haven't got any dope on it and would certainly be glad to hear from anybody who can enlighten us. We should say offhand though that if these facts are correct it might just be possible that this is one of those steam planes that we've been telling you about because you know they are absolutely silent.

* * *

NOW here is Ben Haller of Leonia, N. J., who has a grievance against us. He writes:

For several months I have been buying copies of your magazine and I think it is very interesting. There is, however, one sickness POPULAR AVIATION *seems to have: that is this Purcell guy who, whenever he is sore, has to take it out on us with such articles as "How to Jump from a Spinning Ship."*

It could be told in one sentence: When jumping from a spinning ship, you're very apt to be hit by its tail.

If he wants the world to know how hot he is, why doesn't he write it all out and send it to Judge. Otherwise I think your magazine is fine.

Gee, Ben, do you think Captain Purcell is as bad as all that. You shouldn't be so hard on him because he's really a swell fellow and he's promised to write up a keen article for an early issue.

* * *

WE'VE had a big flock of letters from readers all over the country who have been awfully kind in saying the best possible things about POPULAR AVIATION, but we're too modest to go around patting ourselves on the back, so we'll just have to thank everybody who has told us how much they like P. A. and close this month's Chat with the hope that you will all like this month's issue as well as you have the past issues.

NOTICE!

It has been brought to our attention that there are a number of self-appointed salesmen throughout the country that are representing themselves as POPULAR AVIATION subscription agents. POPULAR AVIATION does **NOT** employ any direct agents. Subscriptions should be mailed to POPULAR AVIATION or they may be placed through any established subscription agency or newsdealer.

Dear Mr. Frawley:
Want you to know how much I enjoyed living at the Park Central.
Nowhere else in America or on the Continent have I found such a residence.
The service is excellent
I enjoyed dining in your restaurant – and my apartment was Perfect!
Upon my return from

APPLAUSE!

Letters of praise are frequent at the PARK CENTRAL, for the sole objective of the Management and Personnel is the creation of an atmosphere of refinement and charm.

Planned to give modern New Yorkers the utmost in comfort and convenience, the Park Central offers with complete hotel service, furnished and unfurnished suites of two, three or more rooms; also duplex and terrace apartments with bath and shower, serving pantry refrigeration, circulating ice water and radio outlet. Many other features not obtainable elsewhere. . . . Inquire Bureau of Rentals.

The Park Central

Seventh Avenue, 55th to 56th Streets
NEW YORK